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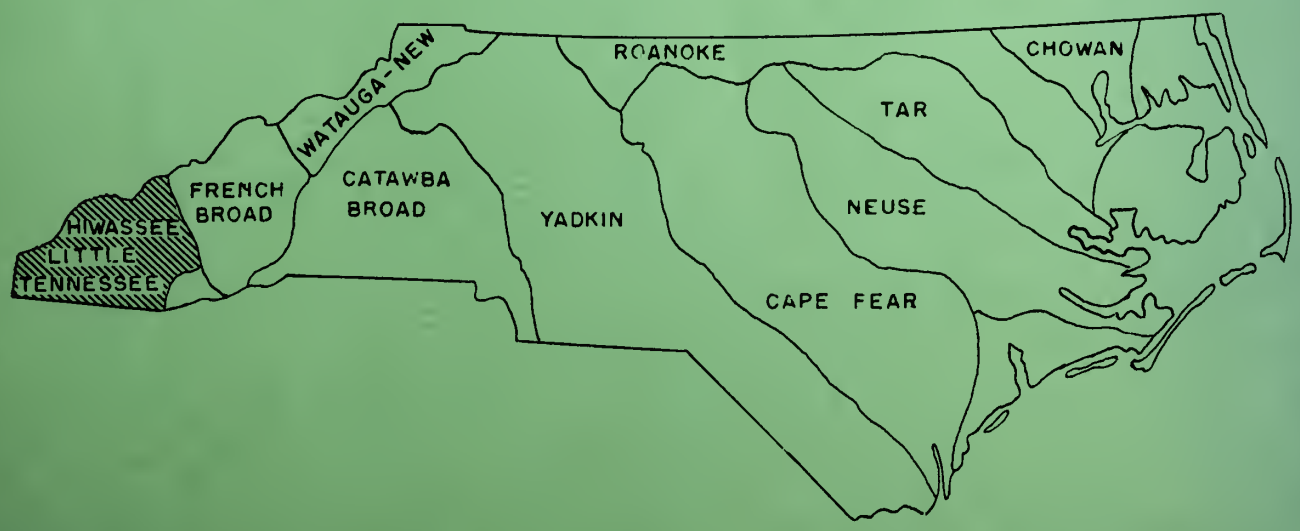
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
WILLIAM P. SAUNDERS, DIRECTOR

DIVISION OF WATER RESOURCES, INLETS AND COASTAL WATERWAYS
BEVERLY C. SNOW, CHIEF ENGINEER

WATER RESOURCES OF NORTH CAROLINA

HIWASSEE AND LITTLE TENNESSEE RIVER BASINS



RALEIGH
1959

STATE OF NORTH CAROLINA

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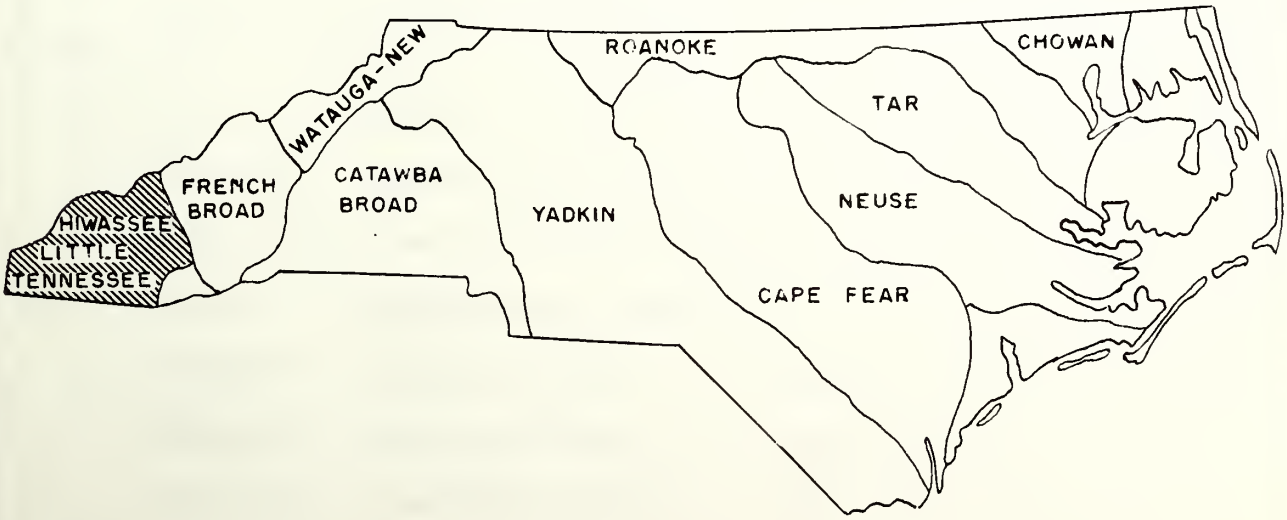

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FOREWORD

This publication comprises Volume X of a series of twelve volumes containing information regarding water resources of North Carolina. Volumes I to IX, inclusive, were published as follows:

I State as a whole, January 1955
II Neuse River Basin, May 1955
III Yadkin-Pee Dee River Basin, August 1955
IV Chowan River Basin, December 1955
V Roanoke River Basin, February 1957
VI French Broad River Basin, November 1957
VII Cape Fear River Basin, September 1958
VIII Broad and Catawba River Basins, October 1958
IX Tar-Pamlico River Basin, November 1958

Volumes XI and XII will provide inventories of the Kanawha and Watauga River Basins and the Coastal Plain River Basins, respectively. Drafts of these inventories have been substantially completed. When the contemplated series have been published, probably by the end of 1959, information pertaining to the entire State will be available to assist in the orderly planning and development of the water facilities required for municipal and industrial expansion and for expansion of the uses of water for agriculture, and to guide watershed authorities, basin associations, soil conservation districts, and other agencies concerned with water uses in accomplishing their purposes.

It is hoped that this publication will assist in the location, development, and expansion of municipal, industrial, agricultural, and other water supplies, and serve as a guide to the future study of water resources of the Hiwassee and Little Tennessee River Basins.

Grateful appreciation is hereby extended to persons who provided material for this volume as follows:

Chapter I - North Carolina State Planning Board and Almanac Publishing Company, Raleigh, North Carolina.

Chapter II - Geological Survey, U. S. Department of the Interior.

Chapter III - Almanac Publishing Company.

Chapter IV - Almanac Publishing Company.

Chapter V - Tennessee Valley Authority.

Chapter VI - Geological Survey, U. S. Department of the Interior.

Chapter VII - Geological Survey, U. S. Department of the Interior.

Chapter VIII - Geological Survey, U. S. Department of the Interior.

Chapter IX - North Carolina State Stream Sanitation Committee.

Chapter X - Soil Conservation Service, U. S. Department of Agriculture.

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CHAPTER I - DESCRIPTION OF WATERSHED

Location and Area - The Hiwassee and Little Tennessee River Basins are located in the Mountain region in the southwest section of North Carolina. The drainage areas of the two basins are 650 square miles and 1,875 square miles, respectively. The Hiwassee River Basin is bounded on the north and east by the Little Tennessee River Basin, on the south by the State of Georgia, and on the west and north by the State of Tennessee, and comprises Cherokee County and most of Clay County. The Little Tennessee River Basin is bounded on the east by the French Broad River Basin, on the south by the State of Georgia, and on the west and north by the State of Tennessee, and comprises Swain, Jackson, Graham, and Macon Counties, and a small portion of Clay County.

Main Streams and Principal Tributaries - The Hiwassee River rises, near U. S. Highway 76, about 17 miles west of Clayton, Georgia. It flows northwest, in Georgia and Clay County, through Lake Chatuge to the Lake Chatuge Dam about 4.5 miles southeast of Hayesville, Clay County; thence northwest and west in Clay County to the Cherokee-Clay County line about nine miles west of Hayesville; and thence northwest in Cherokee County through Hiwassee Lake and Lake Apalachia to Apalachia Dam near the North Carolina-Tennessee State line. It joins the Tennessee River about 30 miles west of Athens, Tennessee.

The Little Tennessee River rises on the north slope of the Blue Ridge Mountains in Rabun County, Georgia, near the North Carolina-Georgia State line. It flows north and northwest in Macon County, through Lake Emory to the Swain-Macon County line about nine miles south of Bryson City, Swain County; thence northwest, in Swain County, to the Swain-Graham County line about eight miles west of Bryson City; and thence west, along the Swain-Graham County line, through Lake Fontana and Lake Cheoah to the North Carolina-Tennessee State line about 12 miles northwest of Robbinsville, Graham County. It joins the Tennessee River at Ft. Loudoun Dam near Lenoir City, Tennessee.

The principal tributaries of Hiwassee River are Nottely and Valley Rivers. The principal tributaries of Little Tennessee River are Tuckasegee, Oconaluftee, Nantahala, Cheoah, and Cullasaja Rivers.

Nottely River rises in Georgia, near U. S. Highway 19 - 129, about three miles south of Blairsville and flows, from the North Carolina-Georgia State line about eight miles southwest of Murphy, north, southwest, and northeast in Cherokee County to its confluence with Hiwassee River in Hiwassee Lake about 2.5 miles west of Murphy.

Valley River rises in the northeast corner of Cherokee County and flows southwest to its confluence with Hiwassee at Murphy.

Tuckasegee River rises, in Jackson County near the Jackson County-Transylvania County line, about 15 miles west of Brevard, Transylvania County, and flows generally northwest, in Jackson County through Glenville Lake, and west in Swain County, to its confluence with Little Tennessee River in Lake Fontana about ten miles west of Bryson City.

Oconaluftee River, a tributary of Tuckasegee River, rises in the Great Smoky Mountains National Park about 16.5 miles northeast of Bryson City and flows southeast, south, and southwest along National Park Road to its confluence with Tuckasegee River about five miles northeast of Bryson City.

Nantahala River rises, in the southwest corner of Macon County, near

the North Carolina-Georgia State line, and flows, northwest in Macon County through Aquone Lake, and northeast in Swain County through Nantahala Gorge, to its confluence with Little Tennessee River about 9.5 miles southwest of Bryson City.

Cheoah River rises in the southeast corner of Graham County and flows generally northwest through Lake Santeetlah to its confluence with Little Tennessee River at Cheoah Dam in the northwest corner of Graham County.

Cullasaja River rises, in the southeastern corner of Macon County, about 3.5 miles northeast of the Town of Highlands. It flows northwesterly and joins Little Tennessee River at Franklin, county seat of Macon County.

Topography and geology - The topography of the basins is everywhere mountainous, varying in elevation between 1,500 feet and 2,000 feet in the stream valleys, and between 4,000 and 5,000 feet on the mountain summits. On the east, the Little Tennessee River Basin is bordered by the Balsam Mountains and Tennessee Ridge and, on the Tennessee State line, the western limit of the basins is marked by the Unaka and Great Smoky Mountains. Included in the area covered by the basins are the Snowbird Mountains, Valley River Mountains, Yellow Mountains, Cheoah Mountains, Cowee Mountains, Nantahala Mountains, and several lesser ranges.

The rocks of the basins may be classed principally as oligoclase-biotite schist and albite-chlorite schist. There is a belt of quartzites and slates on the northwestern border of the Little Tennessee River Basin and, on the southeastern border, there is a strip of carboniferous granite. A belt of Cockeysville marble and associated volcanic-rocks crosses the central part of the Hiwassee River Basin. Predominant rocks in the six counties of the basins are as follows:

Clay County - oligoclase-biotite schist, albite-chlorite schist, and garnetiferous phyllonite.

Cherokee County - albite-chlorite schist, garnetiferous phyllomite, Cockeysville marble, Setters formation, and associated volcanic-rocks.

Graham County - same as Cherokee County.

Jackson County - oligoclase-biotite schist, carboniferous granite, albite-chlorite schist, and garnetiferous phyllonite.

Macon County - oligoclase=biotite schist and carboniferous granite.

Swain County - carboniferous granite, albrite-chlorite schist, garnetiferous phyllonite, granite gabbro, and hornblende gneiss.

Cover and climate - Between 75 and 80 percent of the areas covered by these basins consists of forest lands, the remainder being farm woodland, woodland pasture, and cultivated land.

The mean-annual temperature in the Hiwassee River Basin varies between 56 and 57 degrees. In the Little Tennessee River Basin, the mean-annual temperature varies from 57 degrees, in the upper part, to a low of 51 degrees in the southwestern corner, with an average for the whole basin of about 55 degrees.

The mean-annual rainfall for the Hiwassee River Basin varies between 50 and 70 inches, with a mean of about 60 inches for the whole basin. In the Little Tennessee River Basin, the mean-annual rainfall varies from 45 inches in the eastern-central portion to over 80 inches in the southwestern corner. The latter point has the highest mean-annual rainfall at any point in North Carolina. The mean for the entire Little Tennessee River Basin is approximately 60 inches.

Population - During the period from 1900 to 1930, the total population of the Hiwassee and Little Tennessee River Basins increased from 53,093 to 70,185, a gain of over 32 percent. In 1937, there were no towns of 2,500 or more population in either of these basins. The 1950 populations of the county seats in the basins were as follows: Murphy, Cherokee County - 2,433; Hayesville, Clay County - 356; Robbinsville, Graham County - 515; Franklin, Macon County - 1,975; and Bryson City, Swain County - 1,499. The total population of both basins may be classed as predominantly rural. The 1940 and 1950 populations of each of the counties indicated above may be found hereinafter in this chapter under "General Information regarding Counties". The combined population of the six counties decreased from 79,059 in 1940 to 76,542 in 1950.

Industry - The total number of industrial establishments in the Hiwassee and Little Tennessee River Basins decreased from 224 in 1900 to 84 in 1930. The number of employees at these establishments, however, increased during this period from 412 to 1,804. In 1930, these industries paid $1,573,715 to their employees, an average annual wage of $872, and manufactured products valued at $7,692,259. Information regarding the 1950 industries in the basins may be found hereinafter in this chapter under "General Information regarding Counties". Lumbering was, at one time, an important industry in the basins. A considerable part of the timber has been cut over. Principal types of commercial timber are oak, hickory, pine, maple, poplar, ash, and walnut. Spruce and fir are found on the mountain summits in this region.

Minerals - A great variety of minerals of commercial importance is to be found in the Hiwassee and Little Tennessee River Basins. Commercial-mining operations are carried on to produce mica, copper, feldspar, talc, soapstone, limestone, marble, vermiculite, and olivine. Conduct of mining operations in the basins is as follows:

Cherokee County - Stone, marble, talc, and soapstone.
Clay County - Talc and soapstone.
Graham County - Copper and limestone.
Jackson County - Mica, copper, and olivine.
Macon County - Mica, vermiculite, talc, and soapstone.
Swain County - Feldspar and talc.

Transportation - The Southern Railway System operates a line for freight only from Murphy, Cherokee County, to Asheville, Buncombe County. The Tallulah Falls Railroad extends from Franklin, Macon County, to Cornelia, Georgia, on the main line of the Southern Railway from Charlotte to Atlanta. The Louisville and Nashville Railroad has a line from Murphy southwest into Georgia. No commercial airline is known to operate in the Hiwassee and Little Tennessee River Basins. The Andrews-Murphy Airpark is located on U. S. Highway 19-129 southwest of Andrews, Cherokee County.

The principal highways within, or crossing, the basins are as follows:

U. S. Highway 129 - Knoxville, Tennessee to Athens, Georgia (via Murphy, Cherokee County).
U. S. Highway 19 - Asheville, North Carolina, to Atlanta, Georgia.
U. S. Highway 441 - Knoxville, Tennessee to Athens, Georgia (via Franklin, Macon County).
U. S. Highway 64 - Chattanooga, Tennessee, to Manteo, Roanoke Island, Dare County.
U. S. Highway 23 - Atlanta, Georgia, to Toledo, Ohio.
N. C. Highway 28 - Highlands, Macon County to Bryson City, Swain County.
N. C. Highway 107 - High Hampton, Jackson County, to Sylva, Jackson County.

Mapping - Plan and profile maps of the Hiwassee and Little Tennessee Rivers have been prepared by the District Engineer, Corps of Engineers, U. S. Army, Nashville, Tennessee. The Tennessee Valley Authority has done extensive mapping in the basins in connection with its Apalachia, Hiwassee, Chatuge, and Fontana projects. U. S. Geological Survey topographic maps have also been prepared for the area covered by the two basins, although some of these maps were made from surveys prior to 1896 and without spirit-level control. The State Highway and Public Works Commission has prepared highway maps of every county in the State.

General Information regarding Counties Within or Partially Within the Hiwassee and Little Tennessee River Basins.

Cherokee County - This county was formed in 1839 from Macon County and was named for the Indians who once held the territory. The Cherokee Indians (Qualla) live on a reservation in the Nantahala National Forest in the northwestern part of Cherokee County.

The county lies at the southern tip of the Great Smoky Mountains and is the extreme southwestern county of the State, which is said to extend "from Manteo (Dare County) in the east to Murphy (Cherokee County) in the west". Most of its area is in fertile valleys, criss-crossed by mountain ranges and the Valley River. The State's most extensive marble and limestone deposits are located in this county. Brown-iron ore and talc are found in commercial quantities. The principal merchantable species in forests are oak, poplar, and yellow pine. Waters include the Hiwassee, Valley, and Nottely Rivers and numerous creeks. The Tennessee Valley Authority has erected power-generation plants at Appalachia and Hiwassee Dams. Appalachia Dam is on Hiwassee River at a short distance up stream from the North Carolina-Tennessee State Line and backs water up to the Hiwassee Dam.

Corn, vegetables, and potatoes are the chief crops. This county is an important livestock-section. Hatching eggs, for the broiler industry, are shipped throughout the southeast. There are some small industries, of which cutting and processing of wood dominate the field. The tourist business is important and is stimulated by development of Lake Appalachia and Hiwassee Lake, and opening of the Great Smoky Mountains National Park.

Points of interest, in addition to the National Park and the T.V.A. lakes indicated above, include quarries, the Cherokee County Courthouse built of local regal-blue marble in 1926, the Nantahala National Forest, and the Palmer Museum (Private) at the community of Marble, which contains pioneer and Indian relics and mineral specimens.

Communities include Murphy (county seat), Andrews, Beaverdam, Bellview, Boiling Springs, Culberson, Ebenezer, Grandview, Letitia, Liberty, Little Brasstown, Macedonia, Marble, Martin's Creek, Ogreeta, Patrick, Peachtree, Postell, Ranger, Shady Grove, Slow Creek, Sunny Point, Suit, Texana, Tomotla, Unaka, Violet, and Wolf Creek.

Rain (inches)	60.74
Snowfall (inches)	10.2
Mean annual temperature (degrees)	55.4
Growing season (days)	177
Corn (1951 Val.)	$591,280
Hay (1951 Val.)	$171,010
Irish and Sweet Potatoes (1951 Val.)	$145,000
Total Land Area (acres)	298,880
Forest Area (acres)	234,000

Population (1940)	18,813
Population (1950)	18,294
Total Tax Val.	$10,979,193
Tax Rate	$1.72

Clay County - This county was formed from Cherokee County in 1861 and was named in honor of the great orator and statesman, Henry Clay. The Cherokee Indians once inhabited this territory.

A southwestern county, Clay borders on Georgia, Cherokee County, and is very mountainous, with small valleys. The minerals include a low-grade copper ore, corundum, garnet, manganiferous slates, marble, and kaolin clay. A considerable portion of the forest area is included in the Nantahala National Forest. The chief merchantable species of timber are oak, pine, and poplar. Waters include Hiwassee and Nantahala Rivers and Fires, Tusquitee, Crawford, Shooting, Buck, and smaller creeks. Lake Chatuge on Hiwassee River, and Aquone Lake on Nantahala River comprising part of the Clay-Macon County line, are units of the hydroelectric power systems of the Tennessee Valley Authority and the Nantahala Power and Light Company, respectively.

Clay County is predominantly agricultural. Tobacco, corn, hay, poultry, and milk are prominent. There are, in the county, 53 grade-A dairies and 337 poultry flocks which provide hatching eggs for sale. No outstanding industrial development has occurred. Lumbering is the chief occupation other than farming. The tourist business is increasing.

Points of interest include the vista at the Town of Shooting Creek on U. S. Highway 64 overlooking farm valleys, Nantahala National Forest, numerous mountains, and the two lakes indicated above.

Communities include Hayesville (county seat), Elf, Fires Creek, Ogden, Pinelog, Shooting Creek, Tusquitee, and Warne.

Rainfall (inches)	60.74
Snowfall (inches)	10.2
Mean annual temperature (degrees)	57.1
Growing season (days)	300
Hay (1951 Val.)	$122,450
Corn (1951 Val.)	$302,340
Poultry (1951 Val.)	$750,000
Total Land Area (acres)	140,160
Forest Area (acres)	112,100
Population (1940)	6,405
Population (1950)	6,006
Total Tax Val.	$3,027,024
Tax Rate	$1.50

Graham County - This county was formed in 1872 from Cherokee County and was named in honor of William A. Graham, United States Senator, Governor of North Carolina, Secretary of the Navy, and Confederate States Senator.

A small, western Mountain-County, Graham is bordered on the west by the State of Tennessee, on the north by Little Tennessee River, on the east by Swain and Macon Counties, and on the south by the Snowbird Mountains forming the Graham-Cherokee County line. The land is high and rugged. Amphibole asbestos and some copper occur in Graham County. The principal merchantable-species of timber are hemlock, oak, and poplar. Graham has more high-grade, virgin hardwood-

timber than any other county in the State. Waters include Little Tennessee and Cheoah Rivers; Lake Cheoah, Lake Santeetlah, and Fontana Lake; and Yellow, Santeetlah, Squally, Snowbird, Sweetwater, Tuskeegee, Sawyer, Stecoah, Tulula, Panther, and smaller creeks.

Burley tobacco is the leading cash crop. Corn is the second crop as to acreage grown. Ninety-five percent or more of the corn, however, is utilized for feed purposes in the county. Beef cattle comprise the number-one livestock-source of income. Poultry and poultry products, dairying, and sheep follow in that order. The pasture and hay program is becoming larger because of the increase in livestock. Irish and sweet potatoes and other vegetables are raised. Lumbering is the county's only industry. Robbinsville, with two lumber mills, is the lumbering center. The tourist trade is important. Fontana Lake, and Lakes Cheoah and Santeetlah, are units of the hydroelectric power systems of the Tennessee Valley Authority, and the Nantahala Power and Light Company, respectively.

Points of interest, in addition to the three lakes indicated above, include the Joyce Kilmer Memorial Forest, which has one of the finest hardwood forests in America; Nantahala National Forest; the grave, at Robbinsville, of Cherokee Chief Junaluska who saved Andrew Jackson's life at the Battle of Horseshoe Bend in 1814; and a view of Nantahala Gorge (Swain County) at Point Lookout in the southeastern corner of Graham County.

Communities include Robbinsville (county seat), Cheoah, Tuskeegee, Stecoah, Santeetlah, Yellow Creek, and Tapoco.

Rainfall (inches)	60.74
Snowfall (inches)	10.2
Mean annual temperature (degrees)	57.2
Growing season (days)	177
Hay (1951 Val.)	$62,370
Tobacco (1952 Val.)	$418,680
Corn (1951 Val.) est.	$145,900
Total Land Area (acres)	188,800
Forest Area (acres)	160,600
Population (1940)	6,418
Population (1950)	6,886
Total Tax Val.	$8,445,000
Tax Rate	$1.20

Jackson County - This county was formed in 1851 from Haywood and Macon Counties and named in honor of Andrew Jackson, seventh President of the United States. The first county-seat was at Webster, which was built on an Indian mound. In 1913, the county seat was moved about one mile north to Sylva (named for William Sylva, a native of Denmark and an early settler). The Meiggs-Freeman treaty line, marking the Cherokee Indian Reservation, runs through the northwestern corner of the county. This line was surveyed in 1802 and constituted the reservation-boundry until 1819.

In the southwest mountains of North Carolina, Jackson County has a high elevation, with peaks which tower above stream-fed valleys. Extending from the Great Smoky Mountains to the South Carolina border, the county is bounded on the north by the Balsam Range, on the east by the Tennessee Ridge, and on the west by the Cowee Mountains. Mica and kaolin-clay are the chief mineral products of the county. Copper, corundum, garnet, chromite, and nickel ore also occur. The principal merchantable-trees are oak, poplar, white pine, and chestnut. Waters include Oconaluftee, Tuckasegee, East Fork Tuckasegee, and West Fork Tuckasegee Rivers and Soco, Scott, Savannah, Cullowhee, and smaller creeks. Glenville Lake and Tuckasegee

Reservoir on West Fork Tuckasegee River; East Fork Reservoir, Bear Creek Reservoir, and Cedar Cliff Reservoir on East Fork Tuckasegee River; and Wolf Creek Reservoir on Wolf Creek are units of Nantahala Power and Light Company's hydroelectric-power system.

The chief crops are corn and vegetables. Livestock are important. Tobacco is the major-income crop. Hay, Irish and sweet potatoes, and burley tobacco are grown. Sylva is the industrial center. The largest industry in the county is a corrugated-paper plant. There are also, at Sylva, a large plant where leather is tanned and tannic acid is manufactured, lumber mills, and a mica plant. Lumbering is important and sawmills are operated throughout the county. The tourist industry is growing in importance. The Western Carolina Teachers College is located at Cullowhee.

Points of interest include the Cherokee Indian Reservation, the Great Smoky Mountains National Park, Bridal Veil Falls, and Dry Falls, all of which may be reached after short drives from Sylva; Whiteside Mountain, near Cashiers in the southern part of the county, which has one of the highest sheer precipices in Eastern America; the Judaculla Rock, on the Milas Park Farm near East Laporte, which is covered with petroglyphs that have never been interpreted; the High Falls of the Tuckasegee River which plunge 85 feet to the ground; Glenville Lake (elevation 3,492 feet) about 20 miles south of Sylva; and a log building, at Grimshawes, known as the smallest post office in the world.

Communities include Sylva, Cullowhee, Balsam, Cashiers, Glenville, Dillsboro, East Laporte, Argura, Green's Creek, Norton, Speedwell, Beta, Addie, Cowarts, Big Ridge, Whittier, and Bessie.

Rainfall (inches)	45.17
Snowfall (inches)	10.2
Mean annual temperature (degrees)	55.7
Growing season (days)	177
Corn (1951 Val.)	$401,350
Hay (1951 Val.)	$219,020
Livestock and Livestock products sold (1949 Val.)	$384,248
Total Land Area (acres)	319,360
Forest Area (acres)	250,800
Population (1940)	19,366
Population (1950)	19,261
Total Tax Val.	$14,484,272
Tax Rate	$1.53

Macon County - This county was formed in 1828 from Haywood County and was named in honor of Nathaniel Macon, statesman and soldier. De Soto's expedition passed through the region in the early part of the 16th century, and it is believed that Spaniards mined for gold here in 1560.

Macon County is in the south-mountain section of North Carolina and has high topography with fertile valleys, protected from the northern and eastern borders by high mountains. The massive Nantahala Ridge is on the western border. Economic minerals, including mica, kaolin, and asbestos, are produced. Corundum, gold, and many precious and semi-precious stones are found. The chief merchantable species of trees are poplar, oak, chestnut, and white pine. Waters include Little Tennessee, Cullasaja, and Nantahala Rivers; Tellico, Cowee, Coweeta, Middle, Burningtown, Cartoogechaye, Ellijay, and other creeks; and Lake Emory and Aquone Lake.

The main cash-crops are poultry and eggs, livestock, and corn. The region is known for fine apples and cabbages. Lumbering, mining, paper mills, extract factories, and talc, asbestos, and mica mining are the chief industries. A vegetable and fruit canning-plant is located at Prentiss.

Points of interest include Dry Falls and Bridal Veil Falls near U. S. Highway 64 at the corporate limit of Highlands; the site of Nikwasi, an old Cherokee Indian settlement near Franklin, at which the largest Indian mound in the State stands; the Town of Franklin, a botanist's paradise sought by naturalists, at which the shortia, a rare plant which is found only here and in Japan, and a museum and bilogical-research station which houses plant and flora collections, may be seen; Wayah Bald (elevation 5,336 feet) in Wayah State Game Refuge about seven miles west of Franklin, which is one of the highest eastern mountains with a motor road to the top; the Coweeta Experiment Forest, U. S. Forest Service, at which there is located the only hydrological laboratory in the eastern United States; and Standing Indian Wildlife Management Area in the southwestern corner of the county.

Communities include Franklin (county seat), Highlands, Leatherman, Flats, Rainbow Springs, Prentiss, Stiles, Tellico, and Aquone.

Rainfall (inches)	82.63
Snowfall (inches)	18.1
Mean annual temperature (degrees)	55.1
Growing season (days)	178
Poultry and Eggs (1952 Val.)	$800,000
Livestock Sold (1952 Val.)	$700,000
Corn (1952 Val.)	$500,000
Total Land Area (acres)	332,800
Forest Area (acres)	265,500
Population (1940)	15,880
Population (1950)	16,174
Total Tax Val. (1952)	$13,420,753
Tax Rate (1952)	1.10

Swain County- This county was formed in 1875 from Jackson and Macon Counties and was named for David Lowrie Swain, Governor of North Carolina and President of the University of North Carolina. Bryson City and the surrounding area were once inhabited by the Cherokee Indians. The county contains a large part of the Qualla Indian Reservation, home of the eastern band of Cherokees.

Swain County is high in the northwest-mountain section of North Carolina and embraces parts of the Smoky Mountains National Park and the Nantahala National Forest. The extreme ranges in altitude give different climates to sections of the county. It contains the southern limit of the northern spruce-forest and the last-remaining spruce-stand of large size in North Carolina. There are also forests of dead chestnut, oak, and hemlock. The county produces feldspar and formerly produced copper. Marble and limestone are found in a thick vein along the Murphy Division of the Southern Railway System. Kaolin-clays and granite-gneiss occur in the county. Waters include Little Tennessee, Nantahala, Tuckasegee, and Oconaluftee Rivers; Straight Fork, Connelly, Alarka, Forney, Hazel, Eagle, and smaller creeks; and Lakes Cheoah and Fontana, hydroelectric developments of Nantahala Power and Light Company and Tennessee Valley Authority, respectively. Fontana Dam is the world's fourth-largest dam and has backed water almost to Bryson City, an airline distance of about 20 miles. Fontana Lake has a shoreline of 248 miles.

Farms comprise only about 26 percent of the county. The principal

sources of farm income are tobacco, vegetables, corn, and livestock. Oats, rye, Irish potatoes, hay, and fruit are also produced. The industries are small and include finished wood-products, lumbering, mining, and manufacture of furniture, nylon hosiery and gloves. The tourist trade, which has increased substantially since the opening of the Great Smoky Mountains National Park, is now a leading industry.

Points of interest include Clingman's Dome (elevation 6,642 feet) in the center of the Great Smoky Mountains National Park, the crest of which is almost reached by a motor road; Newfound Gap (elevation 5,053 feet), also in this national park and located on U. S. Highway 441 at the North Carolina-Tennessee State line; Nantahala Gorge in Nantahala National Forest, one of the most beautiful drives in North Carolina; Fontana Lake; Soco Gap route, a spectacular drive on U. S. Highway 19 through Cherokee Indian country; Qualla Indian Reservation; a dude ranch on Firetop Mountain near Maggie; Kephart Fish Hatchery near Smokemont; and the realistic Indian settlement of Big Cove near Ravensford.

Communities include Bryson City (county seat), Cherokee, Alarka, Almond, Pocahontas, Wesser, Birdtown, and Ravensford.

Rainfall (inches)	45.72
Snowfall (inches)	11.9
Corn (1947 Val.)	$185,050
Vegetables (1945 Val.)	$101,425
Livestock Sold (1945 Val.)	$101,325
Total Land Area (acres)	348,160
Forest Area (acres)	305,600
Population (1940)	12,177
Population (1950)	9,921
Total Tax Val.	$6,500,000
Tax Rate	$1.70

Watershed Boundaries - The boundary line of the combined area of the Hiwassee River Watershed and the Little Tennessee River Watershed, in a clockwise direction, extends generally as follows:

Beginning at Tricorner Knob on the North Carolina-Tennessee State line;

Thence along the Haywood-Swain, Haywood-Jackson, and Jackson-Transylvania County lines to Mt. Toxaway in the southeastern part of Jackson County;

Thence in Jackson County, along the Blue Ridge through Little Hogback Mountain, Laurel Knob, and Devils Courthouse, to Whiteside Mountain;

Thence along the Jackson-Macon County line and in Macon County, through Satulah Mountain, Dog Mountain, Little Scaly Mountain, and Osage Mountain, to the North Carolina-Georgia State line at a point about six miles southwest of Highlands;

Thence along the North Carolina-Georgia State line to its intersection with the North Carolina-Tennessee State line; and

Thence along the North Carolina-Tennessee State line to the point of beginning.

The boundary line between the Hiwassee River Watershed and the Little Tennessee River Watershed extends generally as follows:

Beginning at a point on the North Carolina-Tennessee State line about 0.5 mile southwest of Laurel Top;

Thence, along the Cherokee-Graham, Cherokee-Macon, and Cherokee-Clay County lines, to Tuni Gap on the Nantahala National Forest Road;

Thence, in Clay County along the ridge, to Bateler Peak (elevation 4,500 feet) on Chunky Gal Mountain; and

Thence in Clay County, along Chunky Gal Mountain and the Blue Ridge, to a point on the North Carolina-Georgia State line about five miles west of the Clay-Macon County Line.

A small segment of the Savannah River Basin extends from Georgia into the southeast corner of Clay County and lies between the Hiwassee River Basin and the Little Tennessee River Basin. A larger segment of the Savannah River Basin extends from Georgia into Macon, Jackson, and Transylvania Counties and lies between the Little Tennessee River Basin and the French Broad River Basin.

Streams in the Hiwassee and Little Tennessee River Basins - There follows a list, alphabetically arranged of streams in the combined area of the Hiwassee and Little Tennessee River Basins, which are shown on available maps. There are a great number of streams, shown on such maps, the names of which are not indicated. There are shown, on the following lists, the stream into which each of the streams, alphabetically placed on the list, flows, and also the county in which the junction of the corresponding two streams is located. It is believed that these lists will be helpful to interested persons in quickly locating, on a county, topographical, or other map, any stream included in the lists, and also to trace the course of the stream throughout the basin in which it is located.

HIWASSEE RIVER BASIN

Stream	Receiving Stream	County in Which Junction Occurs
Beach Creek	Crawford Creek	Clay
Bearpaw Creek	Hiwassee River	Cherokee
Beaver Creek	Valley River	Cherokee
Beaverdam Creek	Hiwassee River	Clay
Bobs Branch	Hiwassee River	Cherokee
Blair Creek	Hiwassee River	Clay
Brasstown Creek	Hiwassee River	Cherokee-Clay
Bristol Branch	Tusquitee Creek	Clay
Brown Creek	Valley River	Cherokee
Camp Creek	Hiwassee River	Cherokee
Cane Creek	Nottely River	Cherokee
Colvard Creek	Valley River	Cherokee
Compass Creek	Tusquitee Creek	Clay
Copper Creek	Beaverdam Creek	Cherokee
Crane Creek	Hiwassee River	Cherokee
Crawford Creek	Brasstown Creek	Clay
Davis Creek	Hanging Dog Creek	Cherokee
Downing Creek	Hiwassee River	Clay
Eagle Creek	Shooting Creek	Clay
Fires Creek	Hiwassee River	Clay
Ford Creek (Cherokee)	Hiwassee River	Polk (Tenn.)
Giesky Creek	Shooting Creek	Clay
Grape Creek	Hiwassee River	Cherokee
Greasy Creek	Brasstown Creek	Clay

Stream	Receiving Stream	County in which Junction Occurs
Gripp Creek	Valley River	Cherokee
Gumlog Creek	Brasstown Creek	Clay
Hanging Dog Creek	Hiwassee River	Cherokee
Hiwassee River	Tennessee River	Bradley-McMinn (Tenn.)
Hothouse Branch	Shooting Creek	Clay
Hyatt Creek	Valley River	Cherokee
Hyatt Mill Creek	Hiwassee River	Clay
Jackie Creek	Shooting Creek	Clay
Johnson Mill Creek	Shearer Creek	Clay
Junaluska Creek	Valley River	Cherokee
Laurel Creek	Hiwassee River	Cherokee
Left Fork	Eagle Creek	Clay
Licklog Creek	Shooting Creek	Clay
Little Brasstown Creek	Brasstown Creek	Cherokee
Little Fires Creek	Fires Creek	Clay
Lyons Branch	Tusquitee Creek	Clay
Marble Creek	Valley River	Cherokee
Martin Creek	Hiwassee River	Cherokee
Matlock Creek	Tusquitee Creek	Clay
Mill Branch	Shooting Creek	Clay
Mill Creek	Hiwassee River	Clay
Muskrat Branch	Shooting Creek	Clay
North Fork	Blair Creek	Clay
Nottely River	Hiwassee River	Cherokee
Owl Creek	Hanging Dog Creek	Cherokee
Peachtree Creek	Hiwassee River	Cherokee
Persimmon Creek	Hiwassee River	Cherokee
Pinelog Creek	Brasstown Creek	Clay
Pounding Creek	Shooting Creek	Clay
Qualls Creek	Hiwassee River	Clay
Right Fork	Eagle Creek	Clay
Rockingchair Branch	Shooting Creek	Clay
Sandy Branch	Tusquitee Creek	Clay
Shearer Creek	Tusquitee Creek	Clay
Shoal Creek	Hiwassee River	Cherokee
Shooting Creek	Hiwassee River	Clay
Shuler Creek	Hiwassee River	Cherokee
Slow Creek	Peachtree Creek	Cherokee
Thompson Branch	Shoal Creek	Cherokee
Thumping Branch	Eagle Creek	Clay
Town Creek	Hiwassee Creek	Clay
Tuni Creek	Tusquitee Creek	Clay
Tusquitee Creek	Hiwassee River	Clay
Valley River	Hiwassee River	Cherokee
Vineyard Creek	Shooting Creek	Clay
Will Scott Creek	Hiwassee River	Clay

LITTLE TENNESSEE RIVER BASIN

Adams Creek	Oconaluftee River	Swain
Alarka Creek	Little Tennessee River	Swain
Allens Branch	Scott Creek	Jackson
Anderson Branch	Tulula Creek	Graham
Atoah Creek	Long Creek	Graham
Auntery Branch	Tulula Creek	Graham

Stream	Receiving Stream	County in Which Junction Occurs
Ball Creek	Drymans Fork Coweeta Creek	Macon
Barker Creek	Tuckasegee River	Graham
Barnett Creek	Buck Creek	Clay
Battle Creek	Ellijay Creek	Macon
Beachflat Creek	Mull Creek	Jackson
Bear Creek	Cheoah River	Graham
Bear Creek	Tulula Creek	Graham
Bearwallow Creek	Caney Fork Tuckasegee River	Jackson
Beasley Creek	Mica City Creek	Macon
Beech Creek	Cheoah River	Graham
Ben Creek	Spring Creek	Macon
Berry Prong Creek	Ellijay Creek	Macon
Big Creek	Cullasaja River	Macon
Blackrock Creek	Soco Creek	Jackson
Blazed Creek	Beasley Creek	Macon
Bob Branch	Hiwassee River	Clay
Bone Valley Creek	Hazel Creek	Swain
Bradley Fork	Little Tennessee River	Swain
Bristol Branch	Hiwassee River	Clay
Bradley Creek	Little Tennessee River	Swain
Brush Creek	Cullasaja River	Macon
Bryson Branch	Tuckasegee River	Swain
Buck Creek	Cullasaja River	Macon
Buck Creek	Nantahala River	Clay
Bucklehorn Creek	Caney Fork Tuckasegee River	Jackson
Buff Creek	Scott Creek	Jackson
Bumgarner Branch	Tuckasegee River	Jackson
Bunches Creek	Straight Fork Creek	Swain
Burgins Creek	Atoah Creek	Graham
Burningtown Creek	Little Tennessee River	Macon
Caler Fork	Cowee Creek	Macon
Campbell Creek	Tulula Creek	Graham
Cane Creek	Tuckasegee River	Jackson
Caney Fork	Tuckasegee River	Jackson
Cartoogechaye Creek	Little Tennessee River	Macon
Cat Creek	Rabbit Creek	Macon
Cedar Creek	West Fork Tuckasegee River	Jackson
Charley Creek	Wolf Creek	Jackson
Chastine Creek	Caney Fork Tuckasegee River	Jackson
Cheoah River	Little Tennessee River	Graham
Choga Creek	Nantahala River	Macon
Cochran Branch	Tuckasegee River	Swain
Cochran Creek	Cheoah River	Graham
Cold Spring Branch	Hazel Creek	Swain
Cold Spring Creek	Whiteoak Creek	Macon
Commissioner Creek	Little Tennessee River	Macon
Connelly Creek	Oconaluftee River	Swain
Cook Branch	Rock Creek	Graham
Coon Creek	Watauga Creek	Macon
Cooper Creek	Tuckasegee River	Swain
Cope Creek	Scott Creek	Jackson
Cowee Creek	Little Tennessee River	Macon
Coweeta Creek	Little Tennessee River	Macon
Cullasaja River	Little Tennessee River	Macon
Cullowhee Creek	Tuckasegee River	Jackson
Dalton Creek	Caler Fork Cowee Creek	Macon

Stream	Receiving Stream	County in Which Junction Occurs
Dark Cabin Creek	Scott Creek	Jackson
Deep Creek	Stecoah Creek	Graham
Deep Creek	Tuckasegee River	Swain
DeHart Creek	Little Tennessee River	Swain
Deweese Creek	Burningtown Creek	Macon
Dicks Creek	Tuckasegee River	Jackson
Dills Creek	Scott Creek	Jackson
Dry Creek	Stecoah Creek	Graham
Drymans Fork	Coweeta Creek	Macon
Eagle Creek	Little Tennessee River	Swain
East Buffalo Creek	Cheoah River	Graham
East Fork	Savannah Creek	Jackson
East Fork	Tuckasegee River	Jackson
Ekaneetlee Creek	Eagle Creek	Swain
Ellijay Creek	Cullasaja River	Macon
Evans Creek	Tessentee Creek	Macon
Falls Branch	Ellijay Creek	Macon
Farley Branch	Little Tennessee River	Graham
Fisher Creek	Scott Creek	Jackson
Flat Branch	Cullowhee Creek	Jackson
Forney Creek	Tuckasegee River	Swain
Franks Creek	Talula Creek	Graham
Gage Creek	Wolf Creek	Jackson
Galbreath Creek	Tuckasegee River	Swain
Gladdens Creek	Cheoah River	Graham
Gold Mine Branch	Cheoah River	Graham
Goose Creek	Oconaluftee River	Swain
Grassy Camp Creek	West Fork Tuckasegee River	Jackson
Greens Creek	Savannah Creek	Jackson
Hares Creek	Tulula Creek	Graham
Haw Gap Creek	Hazel Creek	Swain
Hayes Creek	Little Tennessee River	Macon
Hazel Creek	Little Tennessee River	Swain
Henson Creek	Ball Creek	Macon
Hickory Knoll Creek	Little Tennessee River	Macon
Hooper Branch	Snowbird Creek	Graham
Houston Branch	Cullasaja River	Macon
Huckleberry Creek	Beasley Creek	Macon
Hughes Branch	Tuckasegee River	Swain
Hyde Mill Creek	Cheoah River	Graham
Indian Creek	Deep Creek	Swain
Indian Creek	Nantahala River	Macon
Indian Creek	Soco Creek	Jackson
Iotla Creek	Little Tennessee River	Macon
Jacks Branch	Tulula Creek	Graham
Jacobs Branch	Little Tennessee River	Macon
Jarrett Creek	Nantahala River	Macon
Jenkins Branch	Tuckasegee River	Swain
Jenkins Creek	Soco Creek	Jackson
Johns Creek	Caney Fork Tuckasegee River	Jackson
Jonas Branch	Forney Creek	Swain
Jones Creek	Dark Cabin Creek	Jackson
Juts Creek	Tulula Creek	Graham
Kimsey Creek	Nantahala River	Macon
Knob Creek	Grassy Camp Creek	Jackson
Lakey Creek	Little Tennessee River	Macon

Stream	Receiving Stream	County in Which Junction Occurs
Lands Creek	Tuckasegee River	Swain
Laurel Creek	Ellijay Creek	Macon
Little Buck Creek	Cullasaja River	Macon
Little Buffalo Creek	Squally Creek	Graham
Little Santeetlah Creek	Santeetlah Creek	Graham
Little Savannah Creek	Savannah Creek	Jackson
Little Snowbird Creek	Snowbird Creek	Graham
Little Tennessee River	Tennessee River	Loudon (Tenn.)
Little Tuni Creek	Choga Creek	Macon
Long Branch	Cullowhee Creek	Jackson
Long Creek	Cheoah River	Graham
Matlock Creek	Cowee Creek	Macon
Meadow Branch	Cheoah River	Graham
Mica City Creek	Cowee Creek	Macon
Middle Creek	Little Tennessee River	Macon
Mill Creek	Noland Creek	Swain
Mill Creek	West Fork Tuckasegee River	Jackson
Mingus Creek	Oconaluftee River	Swain
Moore Creek	Nantahala River	Macon
Moore Spring Branch	Twenty Mile Creek	Swain
Moses Branch	Ellijay Creek	Macon
Moses Creek	Caney Fork Tuckasegee River	Jackson
Mountain Creek	Cheoah River	Graham
Mull Creek	Caney Fork Tuckasegee River	Jackson
Nantahala River	Little Tennessee River	Swain
Neddie Creek	East Fork Tuckasegee River	Jackson
Nickajack Creek	Cullasaja River	Macon
Noland Creek	Tuckasegee River	Swain
North Fork	Beech Creek	Graham
North Fork Creek	Scott Creek	Jackson
North Prong	Ellijay Creek	Macon
Norton Creek	Grassy Camp Creek	Jackson
Oconaluftee River	Tuckasegee River	Swain
Ollie Branch	East Buffalo Creek	Graham
Otter Creek	Whiteoak Creek	Macon
Owenby Branch	Little Tennessee River	Macon
Panther Creek	Little Tennessee River	Graham
Panthertown Creek	Tuckasegee River	Jackson
Partridge Creek	Whiteoak Creek	Macon
Payne Branch	Little Tennessee River	Swain
Peachtree Creek	Tuckasegee River	Swain
Peeks Creek	Cullasaja River	Macon
Piercy Creek	Nantahala River	Macon
Pine Creek	West Fork Tuckasegee River	Jackson
Pope Creek	Scott Creek	Jackson
Porter Cove Branch	Cullasaja River	Macon
Prong Creek	Tellico Creek	Macon
Queens Creek (Macon)	Nantahala River	Swain
Rabbit Creek	Little Tennessee River	Macon
Raven Fork	Straight Fork Creek	Swain
Rhinehart Creek	Little Tennessee River	Macon
Ridge Creek	Dark Cabin Creek	Jackson
Roaring Fork	Nantahala River	Macon
Robinson Creek	East Fork Tuckasegee River	Jackson
Rock Creek	Atoah Creek	Graham
Rock Creek	Cheoah River	Graham

Stream	Receiving Stream	County in Which Junction Occurs
Rock Creek	Panther Creek	Graham
Rowan Branch	Hazel Creek	Swain
Rowlin Creek	Nantahala River	Swain
Ryfield Branch	Cheoah River	Graham
Santeetlah Creek	Cheoah River	Graham
Savannah Creek	Tuckasegee River	Jackson
Sawyer Creek	Stecoah Creek	Graham
Scott Creek	Tuckasegee River	Jackson
Shall Stand Creek	Panther Creek	Graham
Shepherd Creek	Cowee Creek	Macon
Shutin Creek	Soco Creek	Jackson
Silvermine Creek	Nantahala River	Swain
Skeenah Creek	Little Tennessee River	Macon
Skitty Creek	Cullasaja River	Macon
Snowbird Creek	Cheoah River	Graham
Soco Creek	Oconaluftee River	Jackson
Sols Creek	East Fork Tuckasegee River	Jackson
South Fork	Beech Creek	Graham
South Fork	Skeenah Creek	Macon
South Prong	Ellijay Creek	Macon
Squally Creek	Santeetlah Creek	Graham
Stecoah Creek	Little Tennessee River	Graham
Straight Fork Creek	Oconaluftee River	Swain
Sugar Cove Creek	Tellico Creek	Macon
Sweetwater Creek	Cheoah River	Graham
Talula Creek	Cheoah River	Graham
Taywah Creek	Bradley Fork Oconaluftee River	Swain
Teague Creek	Tellico Creek	Macon
Tellico Creek	Little Tennessee River	Macon
Tennessee Creek	East Fork Tuckasegee River	Jackson
Tessente Creek	Little Tennessee River	Macon
Tilley Creek	Cullowhee Creek	Jackson
Tobacco Branch	Wolf Creek	Swain
Toot Hollow Branch	Tuckasegee River	Swain
Trout Creek	West Fork Tuckasegee River	Jackson
Tuckasegee River	Little Tennessee River	Swain
Tuskeegee Creek	Little Tennessee River	Graham
Tuttle Pond Creek	Cullasaja River	Macon
Twenty Mile Creek	Cheoah River	Swain
Walnut Creek	Cullasaja River	Macon
Watauga Creek	Little Tennessee River	Macon
Wayehutta Creek	Tuckasegee River	Jackson
Webster Creek	Tuckasegee River	Jackson
Welch Cove	Little Tennessee River	Graham
West Buffalo Creek	Cheoah River	Graham
West Fork	Tuckasegee River	Jackson
White Oak Creek	Nantahala River	Macon
Wine Spring Creek	Nantahala River	Macon
Wolf Creek	Panther Creek	Graham
Wolf Creek	East Fork Tuckasegee River	Jackson
Wright Creek	Santeetlah Creek	Graham
Wrights Creek	Soco Creek	Jackson
Yellow Creek	Cheoah River	Graham
Yellowhammer Branch	Cheoah River	Graham

CHAPTER II - USE OF WATER FOR DOMESTIC AND MUNICIPAL PURPOSES

"Descriptions and Chemical Character of Public Surface Water Supplies in North Carolina, U. S. Geological Survey, Raleigh, 1947", prepared in cooperation with the State Board of Health, contains the following information regarding public surface-water supplies in the Hiwassee and Little Tennessee River Basins. Ownership is municipal unless otherwise indicated.

Andrews, Hiwassee River Basin, Cherokee County

Population - 1940: 1,520 (1950: 1,397)
Supplies also about 80 people outside of city limits.
Source - Beaver Creek
Treatment - Chlorine
Sample Collected - August 14, 1946

Color	3	Bicarbonate	6.0
pH	7.5	Sulfate	1.2
Silica	6.2	Chloride	1.4
Iron	0.02	Fluoride	0.1
Calcium	0.3	Dissolved solids	17
Magnesium	0.7	Total hardness	5
Na + K	1.6		

Bryson City, Little Tennessee River Basin, Swain County

Population - 1940: 1,612 (1950: 1,499)
Supplies also about 300 people outside of city limits.
Source - Lands Creek
Treatment - Chlorine
Sample Collected - September 12, 1946

Color	4	Bicarbonate	7.0
pH	7.0	Sulfate	2.1
Silica	6.8	Chloride	0.6
Iron	0.01	Fluoride	0.1
Calcium	1.1	Nitrate	0.1
Magnesium	0.4	Dissolved solids	18
Na + K	2.2	Total hardness	4

Cullowhee, Little Tennessee River Basin, Jackson County

Population - 1940: about 700
Supplies also about 300 people outside of city limits.
Owner - Western North Carolina Teachers College
Source - Flat Branch (50 percent) and Long Branch (50 percent)
Treatment - Pressure filtration
Sample collected - August 9, 1946

Color	8	Bicarbonate	12
pH	7.2	Sulfate	1.1
Silica	9.4	Chloride	0.8
Iron	0.01	Fluoride	0.1
Calcium	1.8	Nitrate	0.0
Magnesium	1.1	Dissolved solids	25
Na + K	1.6	Total hardness	9

Highlands, Little Tennessee River Basin, Macon County

Population - 1940: 569 (1950:515)
Source - Houston Branch impounded
Treatment - Chlorine
Sample collected - October 28, 1946

Color	2	Bicarbonate	4.0
pH	6.5	Sulfate	0.9
Silica	5.6	Chloride	0.9
Iron	0.02	Fluoride	0.1
Calcium	0.5	Nitrate	0.2
Magnesium	0.4	Dissolved solids	12
Na + K	1.4	Total hardness	3

Hiwassee, Hiwassee River Basin, Cherokee County

Population - 1940: about 250
Ownership - Tennessee Valley Authority
Source - Hiwassee River Impounded
Treatment - Coagulation with alum and soda ash, rapid sand filtration, chlorine, final adjustment of pH with lime.
Sample collected - July 1, 1946

Color	2	Bicarbonate	40
pH	7.8	Sulfate	13
Silica	4.6	Chloride	9.0
Iron	0.04	Fluoride	0.1
Calcium	6.5	Nitrate	0.6
Magnesium	0.7	Dissolved solids	72
Na + K	19	Total hardness	19

Murphy, Hiwassee River Basin, Cherokee County

Population - 1940: 1,873 (1950: 2,433)
Supplies also about 25 people outside of city limits
Source - Marble Creek impounded in Fain Mountain Reservoir
Treatment - Chlorine
Sample collected - July 15, 1946

Color	9	Bicarbonate	6.0
pH	5.5	Sulfate	1.7
Silica	5.9	Chloride	0.8
Iron	0.10	Fluoride	0.1
Calcium	0.9	Nitrate	0.1
Magnesium	0.5	Dissolved solids	17
Na + K	1.8	Total hardness	4

Robbinsville, Little Tennessee River Basin, Graham County

Population - 1940: 399 (1950:515)
Source - Rock Creek and Burgins Creek
Treatment - Chlorine
Sample collected - December 20, 1946

Color	13	Bicarbonate	6.0
pH	6.0	Sulfate	1.7
Silica	4.4	Chloride	0.8
Iron	0.10	Fluoride	0.2
Calcium	1.1	Nitrate	0.1
Magnesium	0.4	Dissolved solids	16
Na + K	1.9	Total hardness	4

Sylva, Little Tennessee River Basin, Jackson County

Population - 1940: 1,409 (1950: 1,382)
Supplies also about 250 people outside of city limits
Source - Dills Creek (70 percent) and Fisher Creek (30 percent)
Treatment - Chlorine
Sample collected - November 12, 1946

Color	10	Bicarbonate	6.0
pH	6.7	Sulfate	1.7
Silica	6.5	Chloride	0.8
Iron	0.01	Nitrate	0.1
Calcium	1.1	Fluoride	0.2
Magnesium	0.4	Dissolved solids	16
Na + K	1.9	Total hardness	4

Tapoco, Little Tennessee River Basin, Graham County

Population - 1940: about 200
Ownership - Carolina Aluminum Company
Source - Yellowhammer Creek
Treatment - Chlorine
Sample collected - September 25, 1946

Color	8	Bicarbonate	7.0
pH	6.8	Sulfate	2.2
Silica	7.7	Chloride	1.5
Iron	0.07	Fluoride	0.1
Calcium	1.4	Dissolved solids	22
Magnesium	0.7	Total hardness	6
Na + K	1.9	Nitrate	0.1

The following material is taken from "Progress Report No. 2, Public Ground-Water Supplies in North Carolina, U. S. Geological Survey, Raleigh, 1949", prepared in cooperation with the State Board of Health. Ownership is municipal unless otherwise indicated.

Dillsboro, Little Tennessee River Basin, Jackson County

Population - 1940: 290 (1950: 198)
Source - Well
Depth of well (ft.) - 355
Diameter of well (in.) - 6
Sample collected - Dec. 11, 1946
Treatment - None

Color	4	Bicarbonate	56
pH	7.8	Sulfate	15
Silica	20	Chloride	3.0
Iron	0.02	Fluoride	0.2
Calcium	14	Dissolved solids	94
Magnesium	2.1	Total hardness	44
Na + K	10		

Franklin, Little Tennessee River Basin, Macon County

Population - 1940: 1,249 (1950: 1,975)

Sources	Well 1	Well 2	Well 3
Depth of well (ft.)	335	755	445
Diam. of well (in.)	6	8	8
Yield (g.p.m.)	45	30	80
Samples collected	11-19-47	11-19-47	11-19-47

Franklin (cont'd.)	Well 1	Well 2	Well 3
Treatment	None	None	None
Color	2	0	2
pH	6.4	6.2	6.4
Silica	17	14	12
Iron	0.22	3.5	0.49
Calcium	4.0	1.9	1.8
Magnesium	2.2	1.3	1.1
Na + K	4.2	3.3	3.9
Bicarbonate	21	15	15
Sulfate	6.8	2.0	1.7
Chloride	1.8	1.0	1.2
Fluoride	0.1	0.1	0.1
Nitrate	1.4	1.6	1.8
Dissolved solids	49	32	30
Total hardness	19	10	9

Hayesville, Hiwassee River Basin, Clay County

Population - 1940: 336 (1950: 356)
Sources - Johnson and Thompson Springs
Sample (treated water) collected - Jan. 4, 1947
Treatment - Chlorination

Color	4	Bicarbonate	10
pH	5.4	Sulfate	0.8
Silica	8.5	Chloride	1.2
Iron	0.05	Fluoride	0.1
Calcium	1.2	Nitrate	0.4
Magnesium	0.5	Dissolved solids	20
Na + K	2.9	Total hardness	5

Whittier, Little Tennessee River Basin, Jackson County

Population - 1940 (est.): 150
Sources - 2 springs
Sample collected - Feb. 1, 1949
Treatment - None

Color	4	Bicarbonate	8
pH	6.6	Sulfate	1.0
Silica	7.4	Chloride	1.1
Iron	0.06	Fluoride	0.1
Calcium	1.0	Nitrate	0.3
Magnesium	0.3	Dissolved solids	17
Na + K	2.7	Total hardness	4

CHAPTER III - USE OF WATER FOR AGRICULTURE

General - As indicated in Chapter I of this publication, the principal occupation of the people of the Hiwassee and Little Tennessee River Basins is the raising of agricultural products. The soils of the basins are adopted to growing a variety of products. Information pertinent to the chief crops in the basins may be found in Chapter I under "General Information regarding Counties".

Data regarding Agricultural Production - Information regarding farm population, total land in farms, harvested cropland, idle cropland, use of fertilizer, and agricultural products for the counties lying wholly or partially within the Hiwassee and Little Tennessee River Basins, according to the 1952 Farm Census of 1951 crops, is shown below on this page.. The figures are in acres, unless otherwise indicated.

ITEM	CHEROKEE COUNTY	CLAY COUNTY	GRAHAM COUNTY	JACKSON COUNTY	MACON COUNTY	SWAIN COUNTY	TOTAL
Harvested Cropland	16,436	8,602	4,216	13,527	17,352	5,044	65,177
Idle Cropland	6,746	3,294	1,437	3,570	5,586	479	21,112
Pasture	14,877	10,407	6,076	26,496	24,723	8,257	90,836
Woods, Home-sites, etc.	112,173	33,140	32,449	71,231	84,270	42,817	376,080
Corn Harvested	8,855	4,174	2,018	5,303	6,857	2,685	29,892
Tobacco Harvested	55	65	316	70	46	35	587
Peanuts	-	6	-	-	-	-	6
Wheat	139	164	-	-	102	-	405
Oats	300	303	6	138	353	1	1,101
Other small grains	23	89	6	79	120	4	321
Soybeans	71	103	13	100	165	-	452
Lespedeza	21	21	2	4	58	-	106
Hay Crops Harvested	1,187	969	65	1,181	1,841	121	5,364
Other hays cut	3,818	2,793	1,570	4,819	5,832	1,349	20,181
Irish potatoes	621	132	133	438	567	188	2,079
Sweet potatoes	109	37	39	59	107	37	388
Other vegetables grown	22	13	7	389	525	17	973
Other crops harvested	983	400	178	1,150	1,105	524	4,340
Total land in farms	150,232	55,443	44,178	114,824	132,331	56,597	553,605
Total land area	298,880	140,160	188,800	319,360	332,800	348,160	1,628,160
Comm.fert.used, tons	2,313	1,050	765	1,829	3,031	516	9,504
Sows and Gilts, No.	220	308	57	149	817	25	1,576
Cows and Heifers, No.	2,953	2,209	1,091	3,016	5,087	1,289	15,645
Hens and Pullets, No.	82,676	124,582	17,490	45,760	85,353	17,812	373,673
Tractors in usable condition, No.	96	90	28	50	109	13	386
Farm population, No.	10,421	4,035	3,982	9,844	9,099	3,617	40,998
Total population, 1950, No.	18,294	6,006	6,886	19,261	16,174	9,921	76,542

Permits to use Water for Irrigation - The following permits, to use surface water in the Hiwassee and Little Tennessee River Basins for the purpose of irrigation have been issued by the Director of the Department of Conservation and Development in accordance with the provisions of Section 113-8.1, General Statutes of North Carolina, as amended:

Cherokee County
None

Clay County
None

Graham County
None

Jackson County

Permit No.	Name	Address	Source	Amount (c.f.s.)
354	J. D. Parker	Sylva	Bumgarner Br.	0.33
355	Mrs. Lucy Bumgarner	Sylva	Bumgarner Br.	0.22
356	Lewis Bumgarner	Sylva	Br. of Mill Creek	0.11
357	Edgar Bumgarner	Sylva	Br. of Mill Creek	0.11
175	T. R. Crawford	Tuckasegee	Woods Branch	0.12
177	J. L. Waldrop	Tuckasegee	E. Fk. Tuckasegee R.	0.14
176	T. R. Crawford	Tuckasegee	E. Fk. Tuckasegee R.	0.12
178	J. L. Waldrop	Tuckasegee	Canoe Creek	0.14

Macon County
None

Swain County
None

CHAPTER IV - USE OF WATER FOR RECREATION

"North Carolina Almanac, 1954-55", published by The Almanac Company, Raleigh, North Carolina, contains the following information regarding recreational facilities and use of water for recreation in the six counties lying wholly or partially within the Hiwassee and Little Tennessee River Basins:

Cherokee County - Boating, fishing, and swimming are available on Lake Hiwassee. Nantahala National Forest provides hiking-trails and camping and picnicking facilities. Golf, riding, fishing, and tennis are available at Murphy and Andrews. Bass, bream, pike, and crappie may be caught year-around at Lake Hiwassee. Valley River, Davis Creek, and Hanging Dog Creek are some of the good trout-waters. Deer and bear are found in the uplands. Grouse, quail, and other small game are available to hunters.

Clay County - Fishing and boating are available on Chatuge Lake. Nantahala National Forest provides hiking and picnicking. Good trout streams include Shooting Creek, Nantahala River, and Fires Creek.

Graham County - Swimming, fishing, hunting, riding, tennis, camping, hiking, and boating are available at Lake Santeetlah near Robbinsville. Boats, horses, miniature golf, fishing, etc., are provided at Fontana Village (a large, non-profit resort) near Lake Fontana. Joyce Kilmer Memorial Forest, including Little Santeetlah Creek and numerous tributaries thereof, has trails and picnic areas. Nantahala National Forest, including Yellow, Sawyer, Stecoah, Tuskeegee, Panther, and other creeks also provides trails and picnic areas. A resort at Tapoco offers swimming, tennis, shuffle-board, hiking, and fishing. Year-around fishing for small-mouth bass and rainbow trout is available at Lake Santeetlah. Small-mouth bass and trout are caught in Lake Cheoah. Lake Fontana and its tributaries provide good fishing. The Santeetlah Wildlife Area is located in the western part of Graham County near the North Carolina-Tennessee State line. Bear, deer, and wild boar are numerous, and bear and boar hunts are held. There are also quail, wild turkey, and grouse.

Jackson County - The Cherokee Indian Reservation is located in the northwestern part of the county, and Nantahala National Forest covers most of the rest of the county. Swimming (pool),fishing, and hiking are available at Sylva. Several resorts at Cashiers (Savannah River Basin) provide golf, riding, tennis, boating, swimming, etc. Fishing, hunting, picnic and camp areas, lookout points, and hiking-trails are available in the Nantahala National Forest. Riding, tennis, and fishing are available at Balsam. Small-mouth bass and crappie are found in Glenville Reservoir on West Fork Tuckasegee River. The Tuckasegee River is a good bass and trout stream.

Macon County - Golf, tennis, swimming, riding, and hiking are available at Franklin, and golf, riding, swimming, boating, fishing, and tennis are provided at Highlands. The Standing Indian Wildlife Management Area and the Deep Gap campground have swimming facilities. Picnic grounds, with camping facilities, are available at the Wayah State Game Refuge. Cliffside Lake Area and Van Hook Glade Camp Ground, near Highlands, are also vacation spots. Trout, bass, bream, perch, etc., are found in Aquone Lake on the Nantahala River, Chatooga River, Lake Sequoyah at Highlands, Lake Emory on the Little Tennessee River near Franklin, Cullasaja River, and Nantahala River. Bear, deer, wild turkey, quail, and grouse are available for hunters.

Swain County - The Great Smoky Mountains National Park provides fishing, hiking, camping, picnic areas, and horseback riding. Boating is available on

Lake Fontana. Archery, tennis, riding, fishing, boating, hiking, miniature golf, softball, and sight-seeing boats are provided at Bryson City. Fishing, archery, hiking, and square dancing are available at Cherokee on U. S. Highway 441. Bass, bream, rainbow trout, and brook trout are caught year-around in Lake Fontana. Rainbow trout and brook trout are found in eight streams in the Great Smoky Mountains National Park (May 15-August 31). Bass, bream, and perch are caught in the Little Tennessee River. Small-mouth bass are found in Tuckasegee River and its tributaries. Game includes grouse, quail, squirrel, bear, and deer.

"Engineering Data, TVA Water Control Projects and Other Major Hydro Developments in the Tennessee and Cumberland Valleys, Technical Monograph No. 55, Volume 1", contains the following information regarding use of water, by the Tennessee Valley Authority and the Nantahala Power and Light Company, a subsidiary of the Aluminum Company of America, for generation of hydroelectric power:

Tennessee Valley Authority Projects

Apalachia Project

Location of Dam - On Hiwassee River, in Cherokee County, North Carolina, - at river-mile 66.0; 9.8 miles downstream from Hiwassee Dam; about 0.1 mile east of the North Carolina-Tennessee State Line.

Location of Powerhouse - On Hiwassee River, in Polk County, Tennessee, at river mile 53.5.

Reservoir (Lake Apalachia)

Area - 648 acres
Elevation - 1,280 feet above mean sea level
Length of shoreline, no islands - 31 miles (approx.)
Original river - area, 386 acres
Storage - 58,700 acre-feet

Dam

Material and type - concrete gravity non-overflow dam and spillway
Length, including spillway and cutoff walls - 1,308 feet
Height - 150 feet
Width at base - 100 feet

Generating capacity - 75,000 kilowatts

Hydraulic turbines - 2

Project Cost - $23,679,582

First Unit in Commercial Operation - Sept. 22, 1943

Chatuge Project

Location - On Hiwassee River, in Clay County, at river mile 121.0; 4.5 miles upstream from Hayesville; 2.5 miles downstream (north of) North Carolina-Georgia State line.

Reservoir (Lake Chatuge)

Area - 970 acres
Elevation - 1,928 feet above mean sea level
Backwater length - 13 river miles
Maximum width (2 miles above dam) - 1.5 miles
Shore line

Main shore	128 miles
Islands	4 miles
Total	132 miles

Reservoir (Lake Chatuge cont'd.)

Original area of Hiwassee River - 107 acres
Storage - 247,800 acre-feet

Main Dam (excluding 3 saddle dams)

Material and type - Impervious rolled earth-fill embankment
Length - 2,850 feet
Height - 144 feet
Width at base 980 feet

Generating capacity - 10,000 kilowatts

Hydraulic turbines - 1

Project Cost - $10,011,589

In-service Date of Power Unit - October 1954

Fontana Project

Location - On Little Tennessee River, in Swain and Graham Counties; 0.5 mile upstream from head of Cheoah pool (see Cheoah Project under "Nantahala Power and Light Company" hereinafter); one mile west of Fontana Village, North Carolina; 20 air miles west of Bryson City, Swain County.

Reservoir (Lake Fontana)

Area - 10,670 acres
Elevation - 1,710 feet above mean sea level
Length of shoreline

Main shore	240 miles
Islands	8 miles
Total	248 miles

Length (backwater) - 29 miles
Original area of Little Tennessee River - 1,650 acres
Storage - 1,444,300 acre feet (50th largest in U. S.)

Dam

Material and type - Concrete, gravity
Length - 2,365 feet
Height - 480 feet (11th highest in U. S.)
Width at base - 377 feet

Generating capacity - 202,500 kilowatts
Hydraulic Turbines - 3
Project Cost - $75,795,906
First Unit in Commercial Operation - Jan. 20, 1945

Hiwassee Project

Location - On Hiwassee River, in Cherokee County, at river mile 75.8 20 miles downstream from Murphy, Cherokee County; 60 air miles east of Chattanooga, Tennessee.

Reservoir (Hiwassee Lake)

Area - 6,120 acres
Elevation - 1,524.5 feet above mean sea level
Shoreline-length (no islands) - 180 miles
Original area of Hiwassee River - 1,000 acres
Storage - 438,000 acre-feet

Dam

Material and type - concrete gravity non-overflow dam and spillway
Length, including spillway and cutoff wall - 1,376 feet
Height - 307 feet
Width at base, including apron - 493 feet

Generating Capacity - 117,100 kilowatts

Turbine Units - 1 hydraulic and 1 pump

Project Cost - $23,222,024

First Unit in Commercial Operation - May 21, 1940

Nantahala Power and Light Company Projects

Bear Creek Project

Location - On East Fork Tuckasegee River, in Jackson County, 4.8 miles above confluence of East and West Forks to form Tuckasegee River; 3.6 air miles southeast of Tuckasegee, North Carolina.

Reservoir

Area - 43 acres
Elevation - 1,828.41 feet above mean sea level
Length (approximately) - 1.5 miles
Storage - Negligible

Dam

Material and type - concrete multiple-arch
Length - 341 feet
Height - 36 feet
Crest elevation - 1830.41 feet

Generating Capacity - 980 kilowatts

Ultimate generating capacity - 2,460 kilowatts

Hydraulic Turbines - 2

First unit placed in service - 1925

Cedar Cliff Project

Location - On East Fork Tuckasegee River, in Jackson County, 2.4 miles above confluence of East and West Forks to form Tuckasegee River; 11 air miles southeast of Sylva.

Reservoir

Area - 121 acres
Elevation - 2,330 feet above mean sea level
Backwater length - 2.4 miles
Storage - 6,315 acre-feet

Dam

Material and type - Earthface, rock-fill
Length - 600 feet
Height - 165 feet
Crest elevation - 2,340 feet

Generating Capacity - 6,375 kilowatts

Hydraulic Turbines - 1

Unit placed in commercial operation - Aug. 22, 1952

Cheoah Project

Location - On Little Tennessee River, in Graham and Swain Counties, at river mile 51.4; 0.7 mile north of Tapoco; near the junction of U. S. Highway 129 and N. C. Highway 28.

Reservoir (Lake Cheoah)

Area - 595 acres
Elevation - 1,276.51 feet above mean sea level
Length - 10 miles
Storage - 35,030 acre-feet

Dam

Material and type - Concrete, curved gravity of 400-ft. radius
Length - 750 feet
Height - 225 feet
Spillway crest elevation - 1,257.5 feet
Spillway discharge capacity - 200,000 c.f.s.

Generating Capacity - 110,000 kilowatts

Hydraulic Turbines - 5

Station placed in commercial operation

Units 1, 2, and 3 - Apr. 13, 1919
Unit 4 - Oct. 27, 1925
Unit 5 - Sept. 26, 1949

Franklin Project

Location - On Little Tennessee River, in Macon County, at river mile 113.1; 3.5 airline miles northeast of the Town of Franklin on U. S. Highway 64.

Reservoir (Lake Emory)

Area - 198 acres

Reservoir (Lake Emory cont'd.)

Elevation - 200.22 feet above mean sea level
Backwater length - 4 miles (approx.)
Storage - 395 acre-feet

Dam

Material and type - Concrete, gravity
Length - 462 feet, 10 inches
Height - 35 feet, 6 inches
Spillway crest elevation - 1990.22 feet

Generating capacity - 1,040 kilowatts

Ultimate generating capacity - 3,600 kilowatts

Hydraulic Turbines - 2 installed, 3 to be installed

Two units in operation - 1925

Mission Project

Location - On Hiwassee River, in Clay County, at river mile 106.1; approximately 6 miles east of Murphy, Cherokee County.

Reservoir

Area - 61 acres
Elevation - 1658.47 feet above mean sea level
Backwater length - 1.46 miles
Storage - 283 acre-feet

Dam

Type - Ambursen
Length - 390 feet
Height - 50 feet
Spillway crest elevation - 1643.97 feet

Generating Capacity - 1,800 kilowatts

Hydraulic Turbines - 3

Third unit on line - January 25, 1943

Nantahala Project

Location - On Nantahala River, in Macon County, 22.8 river-miles above its confluence with Little Tennessee River; approximately 16 miles west of Franklin.

Reservoir (Aquone Lake)

Area - 1,605 acres
Elevation - 3,012.16 feet above mean sea level
Backwater length - 4.6 miles
Storage - 138,730 acre-feet

Dam

Material and type - earth and rockfill
Length - 1,042 feet
Height - 250 feet
Width at base - 1,130 feet
Crest elevation - 3,034 feet
Volume - 2,200,000 cubic yards

Generating capacity - 43,200 kilowatts

Hydraulic turbines - 1

Unit on line - April 29, 1949

Queens Creek Project

Location - On Queens Creek, in Macon County, 1.5 river-miles above its confluence with Nantahala River in the southwestern corner of Swain County; one air-mile southeast of the Town of Nantahala on U. S. Highway 19.

Reservoir

Area - 35 acres
Elevation - 3,027 feet above mean sea level
Backwater length - 0.5 mile
Storage - 817 acre-feet

Dam

Material and type - Earth face, rock-fill
Length - 382 feet
Height - 78 feet
Crest elevation - 3,036 feet

Generating capacity - 1,440 kilowatts

Hydraulic turbines - 1

Unit placed in commercial operation - Jan. 28, 1949

Santeetlah Project

Location

Dam - On Cheoah River, in Graham County, 9.3 river-miles below its confluence with Little Tennessee River; 6 air-miles southeast of Tapoco on U. S. Highway 129. This highway passes the dam and is near the reservoir (Lake Santeetlah) for a considerable distance.

Powerhouse - on Little Tennessee River, 4.2 river-miles below Fontana Dam. N. C. Highway 28 passes the powerhouse.

Reservoir (Lake Santeetlah)

Area - 2,863 acres
Elevation - 1,939.92 feet above mean sea level
Length of shoreline - 85 miles
Storage - 158,250 acre-feet

Dam

Material and type - Concrete; variable-radius arch center-section, flanked on either side by a gravity spillway-section and a non-overflow gravity section.
Length - 1,054 feet
Height - 212 feet
Maximum width at base - 180.5 feet
Spillway discharge capacity - 76,100 c.f.s.

Generating capacity - 45,000 kilowatts

Hydraulic Turbines - 2

Station placed in commercial operation - June 7, 1928

Tennessee Creek Project

Location - Two reservoirs supplying a single powerhouse through converging tunnels:

(a) On East Fork Tuckasegee River, in Jackson County, 10.9 river-miles above the confluence of East and West Forks to form Tuckasegee River; 8.0 air-miles southeast of the Town of Tuckasegee.
(b) On Wolf Creek, in Jackson County, 1.7 river-miles above its confluence with East Fork Tuckasegee River; 7.8 miles southeast of Tuckasegee.

Reservoirs

(a) East Fork
Area - 39 acres
Elevation - 3,080 feet
Backwater length - 1.4 miles
Storage - 906 acre-feet

(b) Wolf Creek
Area - 176 acres
Elevation - 3,080 feet
Backwater length - 2.2 miles
Storage - 6,909 acre-feet

Dams

(a) East Fork
Material and type - Earth face, rockfill
Length - 385 feet
Height - 140 feet
Crest elevation - 3,090 feet

(b) Wolf Creek
Material and type - Earthface, rockfill
Length - 810 feet
Height - 180 feet
Crest elevation - 3,090 feet

Generating capacity - 10,800 kilowatts

Hydraulic Turbines - 1

Construction of the project began on September 29, 1952. No information was

available as to when construction was completed and the plant was placed in commercial operation.

Thorpe Project

Location

Dam - on West Fork Tuckasegee River, in Jackson County, 9.7 river-miles above its confluence with East Fork Tuckasegee River; approximately 13 miles east of Franklin.
Powerhouse - on West Fork Tuckasegee River, in Jackson County, 3.8 river-miles above its confluence with West Fork Tuckasegee River; adjacent to N. C. Highway 107.

Reservoir (Lake Glenville)

Area - 1,293 acres
Elevation - 3,480.25 feet
Backwater length - 4.5 miles
Storage - 70,810 acre feet

Dam

Material and type - Earth-faced rock-fill; side-channel spillway, gate and fuse-plug dam controlled
Length
Main dam - 900 feet
Saddle dam - 410 feet
Height
Main dam - 150 feet
Saddle dam - 122 feet
Width at base - 830 feet
Crest elevation - 3,506.75 feet
Volume - 1,060,000 cubic yards

Generating capacity - 21,600 kilowatts

Hydraulic Turbines - 1

Unit on line - October 14, 1941

Tuckasegee Project

Location - On West Fork Tuckasegee River, in Jackson County, 3.1 river-miles above its confluence with West Fork Tuckasegee River; 14 air miles east of Franklin.

Reservoir

Area - 9 acres
Elevation - 2,278.75 feet
Backwater length - 0.5 mile
Storage - 183 acre-feet

Dam

Material and type - Concrete arch
Length - 254 feet
Height - 61 feet
Crest elevation - 2,278.75

(Tuckasegee Project cont'd.)

Generating capacity - 3,000 kilowatts

Unit placed in commercial operation - May 26, 1950

Stream Flow Records - Mean monthly, maximum daily, minimum daily, and mean weekly discharges, all in million gallons per day, at 31 gaging stations in the Little Tennessee and Hiwassee River Basins may be found in "Hydrologic Data on the Little Tennessee and Hiwassee Rivers 1873-1945", published in 1953 by the North Carolina Department of Conservation and Development and prepared in cooperation with the United States Geological Survey. Stream-flow data for years subsequent to 1945, at 19 of these gaging stations, are shown below. The monthly discharges are yearly means. As indicated hereinafter two of these stations were discontinued in 1955.

Cullasaja River at Cullasaja, Macon County

Location (revised) - Water stage-recorder, lat. 35°09'59", long. 83°19'25" at Cullasaja, 0.4 mile downstream from Ellijay Creek and 4.1 miles upstream from mouth. Datum of gage is 2,023.37 feet above mean sea level, datum of 1929, supplementary adjustment of 1936.

Drainage Area - 86.5 square miles

Records available - June 1907 to December 1909 and February 1921 to date in reports of Geological Survey, 1907-9 (revised) in North Carolina Department of Conservation and Development Bulletin 34 and Tennessee Division of Geology Bulletin 34.

Average Discharge - 26 years (1907-9, 1921-45), 143 million gallons

Extremes - 1907-9, 1921-45. Maximum discharge, 12,468 million gallons, Aug. 30, 1940 (gage height - 20.83 feet), by slope-area method; minimum, 12 million gallons Sept. 18-22, 1925, Jan. 2, 1940. Maximum stage known, that of Aug. 30, 1940. A stage of 17.2 feet, from floodmarks, occurred in July 1916. It has been exceeded at other times, from information by the State Highway Commission.

Remarks - Some regulation at low flow by Lake Sequoyah at Highlands.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	164	123	172	218	159	124	127	121	108	130	141
Mean monthly discharge, c.f.s.	254	190	267	337	246	192	196	188	167	202	174
Maximum mean weekly discharge, m.g.d.	640	553	567	672	439	419	601	624	521	665	434
Maximum mean weekly discharge, c.f.s.	991	856	878	1040	680	649	930	966	807	1030	672
Minimum mean weekly discharge, m.g.d.	43	28	45	95	55	32	28	25	19	44	26
Minimum mean weekly discharge, c.f.s.	66	43	69	147	85	50	44	38	30	68	41
Maximum daily discharge, m.g.d.	1410	1370	1160	2950	1080	943	1490	1620	1250	1490	1070
Maximum daily discharge, c.f.s.	2180	2120	1800	4570	1670	1460	2300	2500	1940	2310	1650
Minimum daily discharge, m.g.d.	37	22	42	90	51	28	23	22	18	41	26
Minimum daily discharge, c.f.s.	57	34	65	140	79	44	36	34	28	63	41

Cullasaja River at Highlands, Macon County

Location - Water-stage recorder, lat. 35°03'55", long. 83°13'30", 0.25 mile downstream from Highlands municipal dam, 0.5 mile downstream from Big Creek, and two miles northwest of Highlands. Datum of gage is 3,373.63 feet above mean sea level.

Drainage area - 14.9 square miles.

Records available - August 1931 to date. December 1927 to August 1931 at municipal dam, 0.25 mile upstream.

Average discharge - 17 years (1928-45), 35.3 million gallons.

Extremes - Maximum discharge - 3,295 million gallons on Aug. 30, 1940 (gage height - 9.35 feet), by computation of flow over dam.
Minimum discharge - 0.3 million gallons (regulated) on July 24, July 30, and September 1936 and on November 28, 1939.

Remarks - Low flow regulated by Lake Sequoyah. Slight diurnal fluctuation caused by power plant above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	41.2	34.8	51.2	60.1	40.1	33.9	32.9	35.9	27.9	36.6	29
Mean monthly discharge, c.f.s.	63.7	53.8	78.3	93.1	62.0	52.4	50.9	55.5	43.2	56.7	45.4
Maximum mean weekly discharge, m.g.d.	189	150	185	194	145	119	151	185	124	162	100
Maximum mean weekly discharge, c.f.s.	292	232	286	301	225	184	234	286	192	251	155
Minimum mean weekly discharge, m.g.d.	11	.969	10	19	12	6.2	3.23	4.13	1.49	7.8	5.0
Minimum mean weekly discharge, c.f.s.	17	1.50	16	30	19	9.6	5.0	6.4	2.31	12	7.8
Maximum daily discharge, m.g.d.	411	351	448	795	324	261	452	504	446	324	266
Maximum daily discharge, c.f.s.	636	544	695	1230	501	404	700	780	692	502	412
Minimum daily discharge, m.g.d.	5.9	0.1	2.7	18	11	0.84	0.71	.775	1.16	1.87	1.55
Minimum daily discharge, c.f.s.	9.2	0.2	4.2	28	17	1.3	1.1	1.2	1.8	2.9	2.4

Hazel Creek at Proctor, Swain County

Location - Water-stage recorder, lat. 35°28'38", long. 83°42'58", 0.4 mile northwest of Proctor, 1.3 miles downstream from Rowan Branch, and 5 miles upstream from mouth. Datum of gage is 1,803.39 feet above sea level, datum of 1929, supplementary adjustment of 1936.

Drainage Area - 44.4 square miles.

Records available - October 1942 to October 1952.

Extremes (1942-45) - Maximum discharge - 2,150 mgd Feb. 17, 1944 (gage height - 5.40 feet), from rating curve extended above 323 mgd by logarithmic plotting.

Extremes cont'd.

Minimum discharge - 15 mgd Sept. 18, 1944 (gage height - 1.29 feet).

Station discontinued - October 1952

	1946	1947	1948	1949	1950	1951
Mean monthly discharge, m.g.d.	88.5	69.8	77.5	104	98.8	82.0
Mean monthly discharge, c.f.s.	137	108	120	161	153	127
Maximum mean weekly discharge, m.g.d.	392	640	382	320	361	388
Maximum mean weekly discharge, c.f.s.	607	990	591	496	559	601
Minimum mean weekly discharge, m.g.d.	20	16	15.5	39	23	21
Minimum mean weekly discharge, c.f.s.	31	25	24	60	35	33
Maximum daily discharge, m.g.d.	801	1200	678	937	756	1260
Maximum daily discharge, c.f.s.	1240	1860	1050	1450	1170	1950
Minimum daily discharge, m.g.d.	19	16	14	34	21	20
Minimum daily discharge, c.f.s.	29	24	22	52	33	31

Hiwassee River, below Chatuge Dam, near Hayesville, Clay County

Location - Water-stage recorder, lat. 35°01'45", long. 83°47'45", 0.4 mile upstream from Hyatt Mill Creek, 1.6 miles downstream from Chatuge Dam, and 1.7 miles southeast of Hayesville. Datum of gage is 1,789.90 feet above mean sea level, datum of 1929, supplementary adjustment of 1936.

Drainage area - 190 square miles.

Records available - April 1942 to date. May 1907 to December 1909 and August 1922 to September 1923, at site 1.1 miles upstream, published as Hiwassee River near Hayesville.

Extremes (1907-9, 1922-23, and 1942-45) - Maximum stage recorded - 11.9 feet, on Mar. 13, 1909, site and datum then in use (discharge not determined). Minimum discharge - 0.65 mgd (regulated) on Aug. 3 and 4, 1942.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	375	283	211	402	323	264	342	195	202	386	158
Mean monthly discharge, c.f.s.	580	438	326	622	500	409	529	302	312	597	245
Maximum mean weekly discharge, m.g.d.	1360	1200	1360	891	1470	1290	1150	1390	975	950	859
Maximum mean weekly discharge, c.f.s.	2110	1850	2110	1380	2280	2000	1780	2150	1510	1470	1330
Minimum mean weekly discharge, m.g.d.	1.38	0.90	0.98	2.65	1.06	1.20	0.62	.749	1.38	2.06	4.91
Minimum mean weekly discharge, c.f.s.	2.13	1.40	1.51	4.10	1.64	1.86	0.96	1.16	2.14	3.19	7.6
Maximum daily discharge, m.g.d.	1430	1300	1460	1140	1490	1300	1010	1430	988	956	943

Hiwassee River below Chatuge Dam cont'd.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Maximum daily discharge, c.f.s.	2220	2010	2260	1770	2310	2010	1560	2210	1530	1480	1460
Minimum daily . . discharge, m.g.d.	1.29	0.90	0.90	2.33	0.90	0.78	.517	.646	1.29	1.23	1.36
Minimum daily discharge, c.f.s.	2.0	1.4	1.4	3.6	1.4	1.2	0.8	1.0	2.0	1.9	2.1

Hiwassee River above Murphy, Cherokee County

Location - Water-stage recorder, lat. 35°04'50", long. 84°00'10", on U. S. Highway 64,600 feet upstream from Will Scott Creek, and two miles east of Murphy. Datum of gage is 1,538.23 feet above mean sea level.

Drainage area - 406 square miles.

Records available - August 1939 to date. June 1896 to June 1917 and October 1918 to April 1940, at site at Murphy 2.8 miles downstream, in reports of U. S. Geological Survey. October 1897 to December 1923 (including revised records for January 1901 to December 1902 and January 1904 to June 1917) in North Carolina Department of Conservation and Development Bulletin 34. October 1897 to September 1924 (including revised records for January 1901 to December 1902 and January 1904 to June 1917) in Tennessee Division of Geology Bulletin 34.

Average discharge - 47 years (1898-1945): 441 m.g.d. (adjusted)

Extremes (1896-1917 and 1918-45) - Maximum discharge observed - 14,920 m.g.d. on Mar. 18, 1899 (gage height - 18.4 feet, site and datum then in use) from rating curve extended above 323 m.g.d.

Minimum daily discharge - 6.4 m.g.d. on Dec. 3, 1924 caused by ice and filling of Andrews Reservoir.

Remarks - Some diurnal fluctuation caused by power plant above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	683	501	479	768	611	514	555	411	462	616	428
Mean monthly discharge, c.f.s.	1058	775	742	1189	946	796	859	636	7154	954	663
Maximum mean weekly discharge, m.g.d.	1850	2180	1490	1540	1670	1500	1640	1690	1890	1300	1040
Maximum mean weekly discharge, c.f.s.	2860	3370	2300	2390	2590	2320	2540	2620	2920	2010	1610
Minimum mean weekly discharge, m.g.d.	90	100	66	283	106	81	53	56	68	78	68
Minimum mean weekly discharge, c.f.s.	140	155	102	438	164	125	81	86	106	121	105
Maximum daily discharge, m.g.d.	5680	4970	3490	3710	5320	3750	2990	2440	5980	2850	2640
Maximum daily discharge, c.f.s.	8790	7700	5400	5740	8230	5810	4630	3780	9250	4410	4090
Minimum daily discharge, m.g.d.	58	71	53	229	90	72	40	41	45	62	65
Minimum daily discharge, c.f.s.	90	110	82	359	139	111	62	64	69	96	42

Little Tennessee River at Fontana Dam, Swain County

Location - Power plant, lat. 35°27'17", long. 83°48'18", at Fontana Dam, 0.4 mile downstream from Payne Branch and 5.8 miles upstream from Twenty Mile Creek. Prior to Oct. 1, 1944, water-stage recorder 1,300 feet downstream; datum of gage - 1,275.09 feet above mean sea level. Oct. 1-12: staff gage 2,800 feet downstream, and Oct. 13 to Feb. 12: water-gage recorder 3,000 feet downstream; both gages at 5.09 feet lower datum.

Drainage area - 1,571 square miles.

Records available - August 1938 to July 1955 when gaging station was discontinued.

Extremes (1938-1945)- Maximum discharge - 45,995 m.g.d. on Aug. 30, 1940 (gage-height - 14.94 feet), by computation of flow into Cheoah Reservoir below station.

Minimum daily discharge - 3 m.g.d. during Nov. 8-11, 1944 and from December 24, 1944 to January 1, 1945.

Floods of May 1840 and March 1867 reached stages of 21 feet and 23 feet, respectively (former datum), from flood profiles by Tennessee Valley Authority.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge, m.g.d.	3000	2200	2350	3530	2992	2094	2486	2006	2120
Mean monthly discharge, c.f.s.	4638	3400	3644	5467	4632	3242	3848	3105	3284
Maximum mean weekly discharge, m.g.d.	8070	6850	7360	8010	9170	6180	4470	2850	3020
Maximum mean weekly discharge, c.f.s.	12500	10600	11400	12400	14200	9560	6920	4410	4680
Minimum mean weekly discharge, m.g.d.	1080	917	1100	982	1230	446	736	1320	1310
Minimum mean weekly discharge, c.f.s.	1670	1420	1710	1520	1910	690	1140	2040	2030
Maximum daily discharge, m.g.d.	11400	10100	8200	8400	11100	10800	6320	3150	3500
Maximum daily discharge, c.f.s.	17,700	15,600	12,700	13,000	17,200	16,700	9,790	4,880	5,420
Minimum daily discharge, m.g.d.	25	25	116	26	26	25	297	437	554
Minimum daily discharge, c.f.s.	39	39	180	40	40	39	460	677	857

Little Tennessee River at Needmore, Swain County

Location - Water-stage recorder, lat. 35 20'11", long. 83 31'39", 0.8 mile downstream from Dettart Creek, 0.8 mile north of Needmore, 2.4 miles downstream from Tellico Creek. Datum of gage is 1,771.19 feet above sea level.

Drainage area - 436 square miles.

Records available - June 1944 to date.

Extremes (1944-45) - Maximum discharge - 2,429 m.g.d. on Feb. 17, 1945.
Minimum discharge - 71.7 m.g.d. (regulated) on Sept. 3, 1944 (gage height - 1.35 feet).
Minimum daily discharge - 179 m.g.d. on Sept. 10, 1944.

Remarks - Considerable diurnal fluctuation caused by power plant above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	804	579	742	963	720	569	605	563	557	603	557
Mean monthly discharge, c.f.s.	1245	896	1148	1490	1129	881	937	872	863	933	863
Maximum mean weekly discharge, m.g.d.	3000	3040	2450	2490	2330	2030	2770	2600	2920	2250	2210
Maximum mean weekly discharge, c.f.s.	4650	4700	3790	3860	3600	3140	4290	4020	4520	3480	3420
Minimum mean weekly discharge, m.g.d.	231	158	238	485	294	183	157	157	111	205	139
Minimum mean weekly discharge, c.f.s.	357	244	368	750	455	284	243	243	172	318	215
Maximum daily discharge, m.g.d.	5680	6220	5450	7360	4670	4810	5850	5770	5830	4630	5100
Maximum daily discharge, c.f.s.	8790	9630	8440	11400	7230	7440	9050	8930	9020	7170	7900
Minimum daily discharge, m.g.d.	216	147	151	453	254	178	51	98	46	191	123
Minimum daily discharge, c.f.s.	335	228	233	702	393	275	79	152	71	296	191

Little Tennessee River near Prentiss, Macon County

Location - Water-stage recorder, lat. 35 08'57", long. 83 22'46", 600 feet upstream from Owenby Branch, 0.5 mile upstream from Cartoogechaye Creek, and two miles north of Prentiss. Datum of gage is 2,008.39 feet above mean sea level.

Drainage area - 140 square miles.

Records available - June 1944 to date.

Extremes (1944-45) - Maximum discharge - 840 m.g.d. on Sept. 17, 1945 (gage height - 4.33 feet).
Minimum discharge - 61 m.g.d. on Sept. 13, 1945 (gage height - 1.39 feet).

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	297	200	281	370	276	204	240	208	199	207	197
Mean monthly discharge, c.f.s.	460	309	435	572	427	316	371	322	308	320	305
Maximum mean weekly discharge, m.g.d.	1130	827	911	775	808	730	1160	937	891	900	494
Maximum mean weekly discharge, c.f.s.	1750	1280	1410	1200	1250	1130	1790	1450	1380	1390	765
Minimum mean weekly discharge, m.g.d.	80	54	83	179	104	67	63	59	44	77	61
Minimum mean weekly discharge, c.f.s.	124	84	127	277	161	103	98	92	68	119	95
Maximum daily discharge, m.g.d.	2110	1660	2030	2200	1520	1640	2690	2090	1720	1820	1940
Maximum daily discharge, c.f.s.	3260	2570	3150	3400	2350	2540	4160	3230	2660	2820	3000
Minimum daily discharge, m.g.d.	74	53	78	172	93	62	61	56	42	70	59
Minimum daily discharge, c.f.s.	115	82	120	266	144	96	95	87	87	109	92

Nantahala River at Nantahala, Swain County

Location - Water stage-recorder, lat. 35°17'55", long. 83°39'22", on U. S. Highway 19, one mile northeast of Nantahala, 2.3 miles downstream from Rowlin Creek, and 2.6 miles downstream from Nantahala Dam powerhouse. Datum of gage is 1,894.68 feet above mean sea level.

Drainage area - 144 square miles.

Records available - May 1942 to date.

Extremes (1942-45) - Maximum discharge - 2,326 m.g.d. on July 5, 1948 (gage height - 5.70 feet).
Minimum discharge - 1.49 feet on Sept. 10, 1945.
Minimum daily discharge - 24 m.g.d. on September 26, 1944.

Remarks - Large diurnal fluctuation and considerable regulation caused by power plant above station and Nantahala Reservoir.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	391	304	295	380	395	283	344	239	306	274	243
Mean monthly discharge, c.f.s.	605	470	457	589	612	438	532	370	473	424	376
Maximum mean weekly discharge, m.g.d.	1180	904	585	559	1140	487	995	465	533	421	477
Maximum mean weekly discharge, c.f.s.	1830	1400	906	865	1760	754	1540	720	825	651	739
Minimum mean weekly discharge, m.g.d.	87	56	45	123	116	65	54	47	56	26	19
Minimum mean weekly discharge, c.f.s.	134	87	69	190	179	101	84	73	86	40	30
Maximum daily discharge, m.g.d.	2830	1830	904	1030	2660	950	2130	1180	1230	672	736
Maximum daily discharge, c.f.s.	4380	2830	1400	1590	4120	1470	3290	1830	1910	1040	1140
Minimum daily discharge, m.g.d.	28	20	25	40	25	16	11	11	16	20	15
Minimum daily discharge, c.f.s.	44	31	38	62	39	25	17	17	25	31	23

Nantahala River near Rainbow Springs, Macon County

Location - Water-stage recorder, lat. 35°07'35", long. 83°37'11", on Nantahala Forest Service Road just upstream from Roaring Fork, 1,000 feet downstream from Buck Creek, and 5 miles downstream from Rainbow Springs. Datum of gage is 3,072.97 feet above mean sea level.

Drainage area - 51.9 square miles.

Records available - October 1940 to date.

Extremes (1940-45) - Maximum discharge - 1,912 m.g.d. on Dec. 29, 1942 (gage height - 5.93 feet).
Minimum discharge - 31 m.g.d. on Sept. 10 and 11, 1944 and on Sept. 5, 12, and 13, 1945.

Nantahala River near Rainbow Springs

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	141	122	145	171	151	119	114	109	117	117	118
Mean monthly discharge, c.f.s.	218	189	224	264	234	184	177	169	181	181	183
Maximum mean weekly discharge, m.g.d.	435	619	532	444	421	422	470	512	585	311	333
Maximum mean weekly discharge, c.f.s.	673	958	823	687	651	654	727	792	905	481	515
Minimum mean weekly discharge, m.g.d.	39	32	41	81	60	34	27	22	25	40	32
Minimum mean weekly discharge, c.f.s.	60	49	63	125	93	52	42	34	39	62	50
Maximum daily discharge, m.g.d.	1000	1260	969	1980	950	898	1070	1280	1400	788	565
Maximum daily discharge, c.f.s.	1550	1950	1500	3060	1470	1390	1660	1980	2160	1220	875
Minimum daily discharge, m.g.d.	34	30	38	67	57	31	25	22	25	38	31
Minimum daily discharge, c.f.s.	53	46	59	104	88	48	38	34	38	59	48

Noland Creek near Bryson City, Swain County

Location - Water-stage recorder, lat. 35°29'06", long. 85°30'15", 1.1 miles downstream from Mill Creek, 1.2 miles south of boundary of Smoky Mountains National Park, 3.6 miles upstream from Fontana Reservoir, and 5 miles northwest of Bryson City.

Drainage area - 13.8 square miles.

Records available - October 1935 to date.

Average discharge (1935-45) - 27.8 m.g.d.

Extremes (1934-45) - Maximum discharge - 988 m.g.d. on Aug. 30, 1940 (gage height - 4.87 feet), by critical-depth method.
Minimum discharge - 2.3 m.g.d. on Oct. 24, 1939 (gage height -0.66 feet).

Remarks - Occasional, slight diurnal-fluctuation at low flow caused by small power-plant above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly Discharge, m.g.d.	28.6	27.8	31.1	38.2	34.8	30.1	21.9	24.5	23	30	30
Mean monthly Discharge, c.f.s.	44.2	43.1	48.2	59.1	53.8	46.6	33.9	37.9	34.9	47	46
Maximum mean weekly Discharge, m.g.d.	149	250	130	112	124	120	81	103	151	105	101
Maximum mean weekly Discharge, c.f.s.	231	387	202	174	192	186	125	160	234	163	157
Minimum mean weekly Discharge, m.g.d.	4.46	8.4	6.7	15	9.0	7.1	3.94	4.39	3.49	6.1	3.11
Minimum mean weekly Discharge, c.f.s.	6.9	13	10.3	23	14	11	6.1	6.8	5.4	9.5	4.81
Maximum daily Discharge, m.g.d.	375	515	305	289	315	310	163	264	385	245	218
Maximum daily Discharge, c.f.s.	580	797	472	447	488	480	253	409	596	380	337
Minimum daily Discharge, m.g.d.	3.49	7.1	5.6	13	7.8	6.5	3.88	4.20	3.36	5.8	4.59
Minimum daily Discharge, c.f.s.	5.4	11	8.6	20	12	10	6.0	6.5	5.2	9.0	7.1

Oconaluftee River at Birdtown, Swain County

Location - Lat. 35°27'42", long. 83°21'13", 200 feet upstream from county bridge, 0.5 mile south of Birdtown, 0.6 mile downstream from Adams Creek, 0.6 mile upstream from Goose Creek, and 2.2 miles southwest of Cherokee.

Drainage area - 184 square miles.

History - Established as staff gage on July 10, 1945. Discontinued on Sept. 30, 1946. Re-established as a recording gage on June 28, 1948.

Records available - July 10, 1945 to Sept. 30, 1946 and June 28, 1948 to date.

Maximum stage (1945-50) - 12.0 feet on Jan. 7, 1946 (discharge - 15,000 c.f.s

Minimum stage (1945-50) - 0.88 foot from Oct. 30, 1948 to Nove. 1, 1948 (dis charge - 126 c.f.s.).

Remarks - Occasional ice effect for short periods during extreme cold.

	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	415	349	314	249	267	261	299	318
Mean monthly discharge, c.f.s.	642	540	486	386	413	404	463	493
Maximum mean weekly discharge, m.g.d.	1160	1200	1120	963	1330	1460	1070	1000
Maximum mean weekly discharge, c.f.s.	1800	1850	1740	1490	2060	2260	1660	1550
Minimum mean weekly discharge, m.g.d.	154	65	86	61	57	53	78	83
Minimum mean weekly discharge, c.f.s.	239	101	133	94	88	82	120	129
Maximum daily discharge, m.g.d.	2860	2980	2840	2160	4110	3700	2510	2510
Maximum daily discharge, c.f.s.	4430	4610	4400	3350	6360	5720	3890	3880
Minimum daily discharge, m.g.d.	141	93	83	57	56	53	74	75
Minimum daily discharge, c.f.s.	219	144	128	88	87	82	114	116

Scott Creek above Sylva, Jackson County

Location - Water-stage recorder, lat. 35 23'02", long. 83 12'51", 800 feet downstream from Allens Branch, 3,500 feet upstream from Pope Creek, and 0.75 mile upstream from Sylva.

Drainage area - 50.7 square miles.

Records available - June 1941 to date.

Extremes (1941-1945)

Maximum discharge - 678.3 m.g.d. on Feb. 10, 1946.

Minimum discharge - 5.2 m.g.d. on Sept. 22 and 23, 1941 (gage height - 1.30 feet).

Minimum daily discharge - 16 m.g.d. on Oct. 14, 14, and 22-26, inclusive, 1941, and on Nov. 16-18, 1941, inclusive.

Revisions - The figures of maximum discharge for some water years (October 1 to September 30, inclusive) have been revised.

Remarks - Considerable diurnal fluctuation at low flow caused by several gristmills above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	76.9	61.9	68.5	100	74.9	57.9	59.6	56.7	52.0	54.3	67.0
Mean monthly discharge, c.f.s.	119	95.8	106	155	116	89.7	92.2	87.7	80.1	84.0	103
Maximum mean weekly discharge, m.g.d.	276	335	226	179	249	171	233	272	260	159	163
Maximum mean weekly discharge, c.f.s.	427	518	350	277	385	264	361	421	402	246	253
Minimum mean weekly discharge, m.g.d.	21	25	23	54	28	24	19	17	15	21	22
Minimum mean weekly discharge, c.f.s.	32	38	36	83	43	37	29	26	23	32	34
Maximum daily discharge, m.g.d.	678	704	509	404	551	399	501	743	616	380	298
Maximum daily discharge, c.f.s.	1050	1090	788	625	853	618	775	1150	953	589	461
Minimum daily discharge, m.g.d.	20	23	22	48	23	23	18	16	14	19	21
Minimum daily discharge, c.f.s.	31	36	34	75	35	36	28	25	22	30	32

Shooting Creek near Hayesville, Clay County

Location - Water-stage recorder, lat. 35°01'25", long. 83°42'25", 400 feet downstream from Hothouse Branch, 0.5 mile upstream from Chatuge Reservoir, and 6.5 miles east of Hayesville. Datum of gage is 1,930.33 feet above mean sea level.

Drainage area - 37.6 square miles.

Records available - August 1922 to March 1924, February 1942 to September 1955 when gaging station was discontinued.

Extremes (1922-24 and 1942-45)

Maximum discharge during year - 510 m.g.d. May 17 (gage height - 4.53 feet).
Minimum discharge during year - 8 m.g.d. Sept. 12 (gage height - 1.36 feet)
Maximum discharge observed - 1,537 m.g.d. Dec. 17, 1922 (gage height - 6.80 feet).
Minimum discharge observed - 8 m.g.d. Sept. 26, 1944.
Minimum gage height - 1.36 feet.

Remarks - Records good except those for periods of ice effect which are fair. Slight diurnal fluctuation caused by small mill above station.

	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly disch., m.g.d.	43.8	60.1	84.6	69.1	54.6	51.6	46.8	48.2
Mean monthly disch., c.f.s.	67.8	93.0	131	107	84.5	79.8	72.5	74.6

	1947	1948	1949	1950	1951	1952	1953	1954
Maximum mean weekly disch.,m.g.d.	250	232	266	248	183	231	202	259
Maximum mean weekly disch.,c.f.s.	387	359	411	384	283	357	313	401
Minimum mean weekly disch.,m.g.d.	9.0	15	37	25	14	12	12	8.4
Minimum mean weekly disch.,c.f.s.	14	23	58	39	22	19	18	13
Maximum daily disch., m.g.d.	581	442	1340	618	406	526	485	724
Maximum daily disch., c.f.s.	900	684	2080	956	628	814	751	1120
Minimum daily disch., m.g.d.	8.4	14	32	21	14	12	10	7.8
Minimum daily disch., c.f.s.	13	21	49	33	22	18	16	12

Snowbird Creek near Robbinsville, Graham County

Location - Water-stage recorder, lat. 35°18'40", long. 83°51'35", 0.5 mile upstream from Hooper Branch, 3.1 miles west of Robbinsville, and 4.6 miles downstream from Little Snowbird Creek. Datum of gage is 1,953.57 feet above mean sea level.

Drainage area - 42.0 square miles.

Records available - 1942 to September 1952 when gaging station was discontinued.

Extremes (1942-45) - Maximum discharge - 1,692 m.g.d. on July 30, 1943 (gage height - 5.64 feet).

Minimum discharge - 13 m.g.d. on Dec. 24, 1943 (gage height - 0.89 feet) result of low temperature.

Remarks - Records good except those for period of ice effect, which are fair.

	1946	1947	1948	1949	1950	1951
Mean monthly disch., m.g.d.	108	89.1	101	140	118	92.4
Mean monthly disch., c.f.s.	167	138	157	216	182	143
Maximum mean weekly disch.,m.g.d.	385	678	369	402	436	517
Maximum mean weekly disch., c.f.s.	596	1050	571	623	675	801
Minimum mean weekly disch., m.g.d.	28	21	24	54	30	23
Minimum mean weekly disch., c.f.s.	44	32	37	83	46	36
Maximum daily disch., m.g.d.	743	1290	820	1180	1030	1960
Maximum daily disch., c.f.s.	1150	2000	1270	1820	1600	3030
Minimum daily disch., m.g.d.	25	19	21	47	26	21
Minimum daily disch., c.f.s.	38	30	32	73	41	33

Tuckasegee River at Bryson City, Swain County

Location - Water-stage recorder, lat. 35°25'40", long. 83°26'50", 400 feet downstream from bridge on State Highway 28 at Bryson City, and 0.6 mile downstream from Deep Creek. Datum of gage is 1,716.54 feet above mean sea level.

Drainage area - 655 square miles.

Records available - November 1897 to date in reports of the U. S. Geological Survey. November 1897 to September 1913 in Tennessee Division of Geology Bulletin 34 and North Carolina Department of Conservation and Development Bulletin 34.

Average discharge - 47 years (1898-1945), 1,020 m.g.d.

Extremes (1898-1945) - Maximum discharge - 39,790 m.g.d. on Aug. 30, 1940 (gage height - 15.96 feet) from rating curve extended above 16,150 m.g.d. on basis of logarithmic plotting and slope-area determination at height 15.96 feet.
Mimimum discharge - 17 m.g.d. on Sept. 10, 1925 (gage height - 0.48 foot).
Minimum daily discharge - 20 m.g.d. on Sept. 9 and 19, 1925, caused by filling reservoir on Oconaluftee River, or 120 m.g.d. on Oct. 13, 1925, normal regulation.

Remarks - Some diurnal fluctuation caused by power plant above station. Flow partly regulated by Glenville Lake in Jackson County.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	1114	893	1078	1404	1110	900	848	791	741	858	865
Mean monthly discharge, c.f.s.	1725	1382	1669	2173	1718	1393	1313	1225	1147	1328	1339
Maximum mean weekly discharge, m.g.d.	4130	5330	3530	2930	3420	2570	3110	3530	3740	2350	2740
Maximum mean weekly discharge, c.f.s.	6390	8250	5470	4530	5300	3980	4810	5460	5790	3640	4240
Minimum mean weekly discharge, m.g.d.	337	266	377	711	466	360	247	273	210	316	260
Minimum mean weekly discharge, c.f.s.	521	411	583	1100	721	558	383	422	325	489	410
Maximum daily discharge, m.g.d.	8850	12200	6450	6520	7560	6460	6590	9820	8270	4940	5870
Maximum daily discharge, c.f.s.	13700	18900	9980	10100	11700	10000	10200	15200	12800	7650	9080
Minimum daily discharge, m.g.d.	264	227	331	685	363	284	173	169	145	240	194
Minimum daily discharge, c.f.s.	408	351	513	1060	562	440	268	262	224	372	300

Tuckasegee River at Dillsboro, Jackson County

Location - Water-stage recorder, lat. 35°21'59", long. 81°15'38", 0.4 mile downstream from Scott Creek and 0.5 mile downstream from bridge on U. S. Highway 23 at Dillsboro. Datum of gage is 1950.15 above mean sea level.

Drainage area - 347 square miles.

Records available - May 1934 to date. June 1928 to May 1934 at site 0.4 mile upstream.

Average discharge - 18 years (1928-46: 448 m.g.d.).

Extremes (1928-45)- Maximum discharge - 33.980 m.g.d. on Aug. 30, 1940 (gage height - 21.96 feet, from floodmarks), from rating curve extended above 5,246 m.g.d. on basis of slope-area determination and computation of flow over dam.
Minimum discharge - 26 m.g.d. (regulated) on Oct. 26, 1941 (gage height - 1.61 feet).
Minimum daily discharge - 90 m.g.d. on Sept. 2 and 3, 1930 and on Jan. 2, 1940.

Remarks - Slight diurnal fluctuation caused by small power-plant 0.75 mile above station. Flow partly regulated by Glenville Lake.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	567	421	559	727	545	419	459	386	361	426	414
Mean monthly discharge, c.f.s.	877	652	865	1125	844	649	711	597	559	660	641
Maximum mean weekly discharge, m.g.d.	1580	1850	1470	1340	1570	1130	1690	1550	1410	1360	1210
Maximum mean weekly discharge, c.f.s.	2450	2870	2270	2080	2430	1750	2610	2400	2180	2100	1880
Minimum mean weekly discharge, m.g.d.	169	121	205	331	194	180	141	149	121	150	159
Minimum mean weekly discharge, c.f.s.	261	187	318	513	301	279	218	231	187	232	246
Maximum daily discharge, m.g.d.	4520	4430	3230	4170	3680	2750	3870	4150	2900	2100	2180
Maximum daily discharge, c.f.s.	7000	6860	5000	6460	5700	4260	5990	6430	4490	3250	3380
Minimum daily discharge, m.g.d.	129	97	171	313	178	137	78	81	69	112	92
Minimum daily discharge, c.f.s.	200	150	264	485	275	212	120	125	107	174	143

Tuckasegee River at Tuckasegee, Jackson County

Location - Water-stage recorder, lat. 35°16'55", long. 83°07'37", one mile downstream from confluence of East and West Forks of Tuckasegee River and from the Town of Tuckasegee. Datum of gage is 2,125.16 feet above mean sea level.

Drainage area - 143 square miles.

Records available - June 1934 to date.

Average discharge (1934-45) - 239 m.g.d. (adjusted).

Extremes (1934-45) - Maximum discharge - 26,360 m.g.d. on Aug. 30, 1940 (gage height - 21.1 feet, from floodmarks), by slope-area method.
Minimum discharge - 39 m.g.d. (regulated) on Nov. 8 and 9, 1944 (gage height - 1.19 feet).
Minimum daily discharge - 39 m.g.d. on Nov. 8, 1944.

Remarks - Records good except those for periods of ice effect, which are fair. Flow partly regulated by Glenville Lake.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	289	222	313	362	281	216	236	202	174	233	179
Mean monthly discharge, c.f.s.	447	344	485	561	435	335	365	313	270	360	277
Maximum mean weekly discharge, m.g.d.	795	775	1300	620	724	536	846	749	482	833	539
Maximum mean weekly discharge, c.f.s.	1230	1200	2010	960	1120	829	1310	1160	746	1290	834
Minimum mean weekly discharge, m.g.d.	67	47	94	130	77	88	33	77	53	19	63
Minimum mean weekly discharge, c.f.s.	103	73	145	202	119	136	51	119	82	29	98
Maximum daily discharge, m.g.d.	1930	1910	2110	2180	2220	1250	2040	2070	627	1490	698
Maximum daily discharge, c.f.s.	2980	2950	3260	3370	3430	1930	3160	3210	970	2310	1080

(Tuckasegee River at Tuckasegee cont'd.)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Minimum daily discharge, m.g.d.	43	36	71	118	60	39	5.2	5.8	6.5	11	4.13
Minimum daily discharge, c.f.s.	67	55	110	182	93	61	8.0	9.0	10	17	6.4

Valley River at Tomotla, Cherokee County

Location - Water-stage recorder and concrete control, lat. 35°08'30", long, 83 58'45", at highway bridge at Tomotla, 0.5 mile upstream from Rodgers Creek. Datum of gage is 1,556.46 feet above mean sea level.

Drainage area - 104 square miles.

Records available - June 1904 to December 1909, January 1914 to April 1917, and October 37 to date.

Average discharge (1904-09, 1914-17, and 1918-45)- 164 m.g.d.

Extremes (1904-09, 1914-17, and 1918-45) - Maximum discharge observed - 5,833 m.g.d. on November 19, 1906 (gage height - 17.3 feet), from rating curve extended above 3,230 m.g.d.
Minimum discharge observed - 8 m.g.d. Several times in August and September 1925 (gage height - 0.52 foot).

Remarks - Records excellent.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Mean monthly discharge, m.g.d.	164	136	162	221	191	151	136	130	133	130	152
Mean monthly discharge, c.f.s.	254	210	250	342	296	233	211	201	206	202	236
Maximum mean weekly discharge, m.g.d.	820	1480	711	775	937	937	493	652	1070	479	556
Maximum mean weekly discharge, c.f.s.	1270	2290	1100	1200	1450	1450	763	1010	1650	742	860
Minimum mean weekly discharge, m.g.d.	28	22	26	74	48	28	30	19	15	29	21
Minimum mean weekly discharge, c.f.s.	43	34	40	115	74	44	47	29	23	45	33
Maximum daily discharge, m.g.d.	2440	3020	1930	2050	2820	3330	1240	1740	3010	1400	1470
Maximum daily discharge, c.f.s.	3770	4680	2980	3170	4370	5150	1920	2700	4660	2160	2270
Minimum daily discharge, m.g.d.	26	21	23	61	41	27	28	17	14	26	21
Minimum daily discharge, c.f.s.	40	32	36	94	64	42	44	27	21	41	32

Discontinuance of gaging stations - The following gaging-stations, data for which are contained in "Hydrologic Data on the Little Tennessee and Hiwassee Rivers, 1873-1945", are, in addition to Hazel Creek at Proctor and Snow Bird Creek at Robbinsville, no longer operated under the cooperative agreement between the United States Geological Survey and the North Carolina Department of Conservation and Development:

Chatuge Reservoir near Hayesville
Fontana Reservoir at Fontana

Hazel Creek at Proctor
Hiwassee Reservoir at Hiwassee Dam
Hiwassee River below Hayesville
Hiwassee River at Murphy
Little Tennessee River at Iotla
Little Tennessee River at Judson
Nantahala River at Almond
Nantahala River at Topton
Nottely River near Ranger
Scott Creek at Sylva.

CHAPTER VII - GROUND WATER

"Hydrologic Data on the Little Tennessee and Hiwassee Rivers, 1873-1945", published by the North Carolina Department of Conservation and Development in 1953 and prepared in cooperation with the Geological Survey, U. S. Department of the Interior, contains the following information.

Occurrence and Movement of Ground Water - Ground water is contained beneath the land surface in rock formations constituting what may be called underground reservoirs. The underground reservoirs in the Little Tennessee and Hiwassee River Basins are of two different types, (1) the clayey and sandy soil and weathered material that underlie the surface to depths ranging from zero to several tens of feet and (2) the underlying bedrock. In the soil and weathered material, water occurs between the individual mineral grains and, in the underlying bedrock, it occurs only in fractures. The fractures generally are not evenly spaced; they may be an inch, or two or several feet, apart. Most of them are interconnected to allow water to move through them. The fractures are, in most places, less than an inch wide. In many places, they are much less in width. The size and number of fractures decrease with depth to such an extent that, at a depth of several hundred feet, there may be only a few fractures, or none at all. Most ground water in the basin area occurs in the zone above a depth of 150 feet. The lower limit of the reservoir, then, is a thick, indefinite zone. The top of the reservoir is a definite, though fluctuating, surface known as the water table.

The part of the precipitation, that reaches the water table, moves slowly through the soil and fractures in the rock, always under the influence of gravity. After water moves almost bodily through the soil and weathered rock, its flow is constricted to the fractures in the bedrock. Because the fractures increase in number and size with depth, the water moves downward and laterally in a somewhat "step-like" manner to discharge points at or near the level of perennial streams. Therefore, the ground water flows through devious, interconnecting fractures, generally in an almost direct path underground from the upland areas to the valleys.

The water table, or the upper surface of the underground reservoirs, is constantly changing its position which, in turn, changes the amount of water in underground storage. The sustained flow of streams in the basin area serves to show that the discharge of ground water as springs is a continuous process. This constant discharge of ground water causes a gradual lowering of the water table except during, and immediately after, periods of significant precipitation, when recharge to the underground reservoir exceeds the discharge from it; these periods of precipitation cause the water table to rise. After a year of normal precipitation, the discharge from the underground reservoir is no more than the recharge to it, so that the water table, at the end of the year, will be at about the same level as at the beginning. There appears to be no evidence to support the common belief that the water table has been declining during recent years.

The relation of the water table to precipitation is complicated by several factors. The proportion of precipitation, that runs off in streams directly, is transpired from plants, evaporates, or reaches the water table, is determined by the intensity and duration of the precipitation, the character and condition of the surface material on which the precipitation falls, and the temperature of the air which affects the rate of evaporation and rate of transpiration of the water by vegetation. In the basin area, there is a noticeable change in the water table with the seasons. The water table generally declines during the summer and autumn, even though summer rains are heavy, because of the large amount of water lost by evaporation and transpiration. Although rainfall is less in the winter and spring, the water table generally rises because losses by evaporation and transportation are greatly reduced.

Aside from local variations in weather, the depth to the water table at any one time depends chiefly on topography and on the permeability of the rocks. Beneath hills and mountains, the water table may be 80 feet or more below the surface whereas, in valleys, it is generally at or near the surface. Beneath hills where fractures are large and abundant enough to discharge into the adjacent valleys, the water table will be lower than where the rocks contain few fractures.

Factors affecting Yields of Wells - In the crystalline and consolidated sedimentary-rocks of the Mountain division, ground water moves along joints and other fractures, cleavage and bedding planes, and planes of schistosity. Drilled wells obtain water from these openings, and the wells, that encounter the most and the largest openings, usually yield the largest supplies. The productiveness of the rocks varies widely, not only from one type of rock to another but also from place to place within each type of rock. Data indicate that the schistose rocks are the best aquifers. Gneiss appears to rank second in productiveness, and granite is somewhat less productive.

One of the most important problems in the Mountain division is to select the best possible site for drilling a well to obtain the maximum quantity of water. Factors to be considered in selecting a well site include texture of the rock, amount and kind of fracturing, shearing, bedding, cleavage and schistosity, veins, thickness of weathered mantle, and topography.

The coarser-grained rocks are, generally, more productive than the finer-grained ones, probably because fracturing or shearing produces larger openings in the coarse-grained rocks than it does in fine-grained rocks. Wells, drilled where fractures and shearing planes are closely spaced, are usually more productive than wells drilled where these openings are more widely spaced. In sedimentary rocks, large openings may occur along bedding planes; and, in metamorphic rocks, whether of sedimentary or igneous origin, planes of cleavage and schistosity are important in the occurrence and movement of ground water. Rocks, in which these planes are abundant and closely-spaced, generally are more productive than rocks in which they are widely spaced.

Quartz veins contain many openings for the storage and movement of ground water. Quartz is a hard, brittle mineral that fractures easily and breaks into relatively large, irregular fragments when subjected to earth stresses. Ground water can usually move more readily through quartz veins than through adjacent rock. Wells, intersecting one or more quartz veins, generally are much more productive than wells that do not so intersect.

The thickness of weathered rock or soil mantle, which covers most of the rocks, is important to the yield of water. A thick layer of weathered rock stores large quantities of water that moves into the fractures of the underlying rock. Both erosion and mass movement of the soil tend to create a rather thick layer of soil mantle along the lower fringes of steep slopes. The upper slopes are almost bare of soil or have only a thin blanket sufficient for the growth of plants.

The topographic features in the basin vary considerably in the extent to which they influence the occurrence of water. The upland areas are steep, thereby allowing a great amount of runoff from precipitation and, consequently, little influent seepage. Of the water that seeps into the rocks on the uplands, much leaks out on the steep slopes, producing a hydraulic gradient away from the top of the uplands. Thus, the water lies deep in much of the upland areas. Wells, located on hills and mountains, penetrate the water table at a greater depth than those in valleys. Upon pumping the wells on the hills, the water table is lowered, creating a cone of depression with the center of the cone at the well. As pumping continues, the cone may be larger and deeper. Its span, however, is limited because of the

topography and because of the relatively-low permeability of rocks at progressively-greater depths below the surface. The yield of wells in these areas is not great.

Wells drilled in lowlands, even though penetrating the same rocks as those on uplands, intersect the water table near the land surface. Thus, the water table can be lowered a greater distance by pumping than in a well of the same depth on a hill. In addition, much natural ground-water discharge, that normally occurs in the valleys, can be saved when pumping lowers the level slightly. In contrast to hills, valleys yield moderately-large supplies of water to wells. Many wells in valleys are capable of yielding more than 50 gallons a minute.

Rocks and their Water-Bearing Characteristics - The quantity and quality of water, that can be obtained from wells and springs, is related to the geology of an area. Consequently, an understanding of the principles of geology is of great value in estimating the ground-water possibilities of an area.

Unfortunately, no adequate geologic map of the entire basin exists, although certain parts have been geologically mapped as the result of special studies. Publications, referring to the geology of the area, are listed below.

"Deposits of Brown Iron Ores (Brown Hematite) in Western North Carolina: North Carolina Geological and Economical Survey Bulletin 31".

"Description of Knoxville Quadrangle: U. S. Geological Survey, Geological Atlas 16".

"Description of Nantahala Quadrangle: U. S. Geological Survey, Geological Atlas 143".

"Great Smoky Formation in the Hiwassee River Basin: Tennessee Academy of Science Journal, Volume 13".

"The Vermiculite Deposits of North Carolina: North Carolina Department of Conservation and Development, Bulletin 50".

"Mica Deposits of the Franklin-Sylva District, North Carolina Department of Conservation and Development, Bulletin 49".

"Corundum and the Peridotites of Western North Carolina: North Carolina Geological Survey, Volume 1".

"Chilhowee Group and Ococe Series of the Southern Appalachians: American Journal of Science, Volume 242".

"Ococe Series of the Southern Appalachians: Geological Society American Bulletin, Volume 60".

"Talc Deposits of the Murphy Marble Belt: North Carolina Department of Conservation and Development, Bulletin 56".

Aside from the loose sandy-deposits that floor many of the valleys, the rocks of the area are relatively dense and consolidated. They represent (1) an immense series of schists, gneisses, and igneous rocks such as granite and gabbro, and (2) restricted belts of shale, slate, quartzite, and limestone.

The schists and gneisses owe their present character and structure largely to metamorphism resulting from earth stresses and to heated solutions that brought in or accompanied the intrusive rocks. As they are now seen, the schists and gneisses have a strong foliation that generally trends northeastward; they are tipped on edge and, interlayered with them at various intervals, there are granites and other intrusive rocks.

Along the northwestern parts of Graham and Swain Counties is a belt of sedimentary rocks composed chiefly of slate, sandstone, and conglomerate. Their

prominent features are the distinct bedding-planes and predominant dark-gray color. Large joints in these rocks are rare and, in fact, about the only open-spaces, through which water can move, are along some of the bedding planes. As a group, they are, perhaps, the poorest water-bearing rocks in the basin area, although too few wells draw water from them to permit reaching a definite conclusion.

A belt of crystalline limestone extends southwestward, from the southwestern part of Swain County, through the Town of Murphy, Cherokee County, to the Georgia State line. It is several miles broad in some places. Owing to the relatively-high solubility of the limestone, it offers less resistance to erosion than adjacent rocks; consequently, it is typically buried beneath residual clay and flood-plain deposits in a broad valley. The few wells in it do not reveal its water-bearing characteristics. As far as observations have been extended, it seems that the limestone has few openings capable of transmitting water. Many openings have been enlarged by solution. Most of these openings however, have been subsequently filled with overlying clay, thereby constricting the flow of water. In almost all cases, the openings are in the upper part of the limestone; therefore, it may be useless to drill deeper than about 100 feet in the rock, especially if the well is located in the valley floor.

The most widespread group of rocks include mica schists and gneisses and many small layers of granite. As a group, the rocks are light to dark gray and are composed of quartz and feldspar, with subordinate amounts of muscovite and biotite mica, garnet, sillimanite, and kyanite. The rocks contain numerous fractures along which ground water moves. Openings along the planes of schistosity, that dip at steep angles, are the most prevalent and the most important in the occurrence of water. However, there are enough joints, crossing the schistosity, to allow movement of water in the area surrounding a well.

The granites are similar to the mica schists and gneisses in composition and color, and differ from them in the lack of schistose planes. They occur as large, nearly-homogeneous masses and as small masses within the schists and gneisses. Their joints are less-systematically arranged than those of the gneisses and schists and are less prominent with depth. The most prominent joints are subparallel to surface topography but flatter. As this jointing, generally known as sheet structure, is somewhat convex on hills and apparently concave in valleys, the natural morement of water in the rocks is from the convex joints of the uplands to the concave joints of the lowlands. Rocks, that show pronounced sheet-structure, yield much more water to wells than on hills. The wells, in the area around Cashiers and Highlands, penetrate granite, and their yields are probably representative of the granites in other parts of the basin area. Because of the significant decrease of joints with depth, it may generally be poor economy to drill deeper than about 250 feet if a satisfactory yield is not available at that depth.

Hornblendic rocks are fairly common in the area. They are black or dark green, and contain large amounts of hornblende and plaglioclase feldspar. In most places, the rocks have been metamorphosed to such a degree that they have a foliated structure. The beds are generally alined parallel with the mica schists and gneisses with which they are associated. The hornblendic rocks occur as beds covering a wide area and as thin beds a few inches or a few feet thick, interlayered with other rocks. Joints, many of which have been enlarged by solution, are fairly common. The best wells of the area penetrate the hornblendic rocks. In fact, the average yield of municipal and industrial wells, in hornblende gneiss, is about 60 gallons a minute. One-half of the wells yield at least 40 gallons a minute.

Ground Water in the Hiwassee and Little Tennessee River Basins

General - The effect of the mountainous topography of the basin, on the occurrence of ground water, is considerable. Topography affects precipitation, the higher mountains receiving the greatest rainfall. Even though runoff from mountainous slopes is large, considerable water seeps, into the soil and the underlying fractures in the bedrock, to become ground water.

The well tables, at the end of this chapter, indicate the great range in yield of wells from place to place. In view of the fact that the most favorable conditions for obtaining a large amount of ground water have not been followed in developing most well-supplies, it is apparent that there should be an even-greater range in yield than indicated.

No methods are available to predict the yield of any well. However, by appraising wells already drilled, it is possible to determine the odds for an untested well to yield more or less than a certain amount. Let us suppose that six similar wells, drilled at similar geologic and topographic sites, have yields of 5, 25, 40, 50, 55, and 200 gallons a minute; it can be stated that there are about two chances out of three that a similar untested-well will yield at least 40 gallons a minute.

Flood Plains and Lowlands - The general movement of both surface and subsurface water is controlled by gravity and is, therefore, toward the valleys. Most valleys, especially those lying between prominent ridges, are filled, to some extent, with rock waste transported from higher slopes during floods. These flood-plain deposits are recharged directly from precipitation and surface runoff from upland slopes, from upland tributary-streams, and from diffuse seepage out of upland slopes. There is considerable gain of water, to the flood-plain deposits also, along their boundaries with the upland slopes because the hydraulic gradient, in the residuum and colluvium on the lower slopes of the ridges, is steep enough to permit the movement of water into the flood-plain deposits. Because the flood-plain deposits stay almost full of water, the water that reaches them does not become a permanent part of the ground-water reservoir. Instead, it represents the approximate amount that discharges from the deposits because they are essentially filled. This rejected discharge, despite its apparent loss to the ground-water body under natural conditions, is saved and becomes usable ground-water when wells are pumped in the vicinity of discharge points in the flood plains.

The flood-plain deposits, consisting of sand, clay, and gravel, are thought to contain a large, but heretofore undeveloped, water-supply. In almost all wells, the deposits are cased off, and water is drawn from the bedrock below. Well drillers report the presence of sand and gravel deposits in the upper parts of many wells in the valleys, and the great amount of well casing, indicating the absence of hard rock, supports their statements. A section of material, beneath a flood plain, can be seen in an abandoned gravel-pit, adjacent to Cullasaja River, halfway between Highlands and Franklin. The deposit is composed of boulders, gravel, and coarse sand, clay being entirely absent. The extremely-high permeability of these deposits is further suggested by the fact that the water table has no perceptible slope toward the river. The thickness of the flood-plain deposits varies from valley to valley and within each valley. It generally is greatest in the middle of a valley where it may be more than 50 feet thick.

In addition to the large amount of water in storage in the flood-plain deposits under natural conditions, there is a good possibility of developing large ground-water supplies from water infiltrated laterally through the deposits

from a nearby stream. The deposits appear to contain coarse-grained material of high permeability, and the streams are plentiful and are relatively pure. It seems reasonable to believe that, in many places, individual wells would yield several hundred, or even a thousand, gallons a minute or more from these deposits.

Upland Areas - Above the graded valley-floors, the topography is so steep that the water table reaches the surface in numerous places, although the soil mantle effectively confines the water except locally where springs occur. Some moisture emerges from fine fractures in the rock and from interstices in the soil, and is lost by evaporation. Thus, the hydraulic gradient is steep, and recharge to the valley fill is considerable.

Springs - Springs occur at all levels above the valley floor except within several tens of feet of a hilltop. They are exceedingly common in the basin area because the slope of the ground, in many places, is steeper than the slope of the water table and transects it. The outstanding feature of these springs is their small yield. Almost all yield less than 10 gallons a nimute each, and most yield only 1 to 3 gallons a minute each. The yield of most of the springs fluctuates little, although the yield of some springs, emerging from the upper slopes of the hills, diminishes during dry seasons.

In addition to the present springs, others may be developed at numerous places on hills where the surface slope transects the water table. Where interconnecting joints in the rocks occur at the junction of the water table and the surface slope, there is discharge of ground water, either as a spring or as diffuse seepage. If the soil zone is extremely thin or absent at this junction, the flow of water from the fractures is concentrated, and a spring results. However, a moderately thin layer of soil, at this junction, permits water, emerging from the fractures, to spread through it, and the water is quickly lost through evaporation. Most springs emerge in the coves at the heads of valleys where the ground is steep, and ground water will have less chance of being dispersed. Springs probably would be larger and more common in such places if the soil did not migrate toward these coves and tend to cover the apertures through which the springs emerge.

Springs in the Little Tennessee and Hiwassee River basins represent an important source of water for rural supplies. Their low yields limit the extent to which they can be used for large municipalities and industries.

Quality of Ground Water - The chemical analyses of ground water, available for inclusion in this report, are not adequate to show the quality of spring and well waters throughout the basin area. However, experience derived from studies of the quality of ground water, in similar rocks of the Piedmont Plateau, suggests that the granites and allied rocks, of high silica content, will yield water of good quality, low in dissolved mineral matter. On the other hand, the hornblendic rocks, containing appreciable amounts of soluble mineral-matter, may yield water of somewhat-higher dissolved solids but still of good chemical quality. The ground water, in all parts of the basin area, should be suitable for most uses. It may contain slightly-less mineral matter than water in similar rocks of the Piedmont Plateau because of the greater circulation of water and because it is in contact, for a shorter time, with the rocks through which it passes.

Records of wells - Information regarding municipal ground-water supplies in the Little Tennessee and Hiwassee River Basins, for the Towns of Dillsboro, Franklin, Hayesville, and Whittier, may be found in Chapter II hereinbefore. Information regarding other ground-water supplies, and additional information re-

regarding the Towns of Franklin and Highlands, are set forth in the following tables pertaining to the six counties within the basins.

Location	Owner	Depth (ft.)	Diam. (in.)	Depth of Casing (ft.)	Water Level (ft. Below Surface)	Yield (g.p.m.)	Remarks
	Cherokee County						
3 mi.E.of Murphy	Duffy Silk Co.	365	8	- -	45	100	Chlorite schist
3 mi.E.of Murphy	N.C.Prison Camp	250	6	111	17	13	Chlorite schist
Murphy	Troy Bowman	165	6	29	- -	1	- -
Murphy	Buick School	179	6	41	- -	15	Drilled in dug well
	Clay County						
Hayesville	Ken Bernard	109	6	84	- -	4	- -
Hayesville	Eugene Waldrop	194	6	144	- -	-	- -
Hayesville	Frank Woodward	89	6	36	- -	25	Hornblende gneiss
Hayesville	Mr. Mingus	135	6	68	20	20	Hornblende gneiss
Hayesville	Clay Co. School	170	6	87	- -	12	Hornblende gneiss
Hayesville	Clay Co. School	185	6	51	34	8	Bailing level 86 ft.
Hayesville	Clay Co. School	250	8	117	- -	14	Pumping level 20 ft.
	Jackson County						
Cashiers	H. A. Zachary	65	6	30	--	20	Granite
Cashiers	Roy Bunn	130	6	21	--	0	Granite
Cashiers	Roy Bunn	130	6	12	—	2	Granite
Cashiers	C. E. Fowler	123	6	66	--	8	Granite
Cashiers	E. N. Loiselle	90	6	10	—	10	Granite
5 mi.N.of Cashiers	Riddell Breedlove	90	6	44	- -	- -	Granite
Whittier	Miller Hall	130	6	84	- -	25	Bailing head 130 ft.
Whittier	Irene Robinson	185	6	118	- -	5	Granite
Whittier	Methodist Church	125	8	24	- -	56	Granite
Webster	M. H. Wooten	82	6	40	- -	5	Granite
Sylva	Log Cabin Assoc.	408	8	98	165	31	Pumping level 220 ft.
Sylva	Log Cabin Assoc	439	8	68	47	35	Pumping level 170 ft.
Sylva	Sam Cogdill	110	6	24	30	20	Pumping level 90 ft.
Sylva	Community Hosp.	407	8	118	155	38	Granite
Sylva	Earl Padgett	66	6	25	- -	35	Bailing level 66 ft.
Sylva	Barkers Cr. Sch.	234	6	38	- -	50	Granite
Dillsboro	Walter Bradley	126	8	70	- -	20	Granite
6 mi.S. of Dillsboro	Mrs.R.O.Higdon	92	6	35	- -	9	Granite
6 mi.S. of Dillsboro	Mrs.J.R.Nichols	112	6	85	25	- -	Granite

Graham County

Location	Owner	Depth (ft.)	Diam. (in.)	Depth of Casing (ft.)	Water Level (ft. below surface)	Yield (g.p.m.)	Remarks
Robbinsville	K.S.Keys	105	6	98	- -	4	- -
Robbinsville	K.S.Keys	130	8	71	- -	2	Granite
Robbinsville	Snow Bird Sch.	150	6	24	7	32	Hornblende gneiss
Stecoah	Earl Edwards	63	6	48	- -	35	- -

Macon County

Location	Owner	Depth (ft.)	Diam. (in.)	Depth of Casing (ft.)	Water Level (ft. below surface)	Yield (g.p.m.)	Remarks
Franklin	Town	337	6	- -	- -	85	Hornblende & Granite Gneiss
Franklin	Town	237	6	- -	- -	55	Same as above
Franklin	Town	755	6	- -	- -	35	Granite Gneiss
Franklin	Town	577	6	- -	- -	25	Well abandoned
Franklin	Town	503	6	108	40	41	Hornblende gneiss
Franklin	Town	282	8	67	15	204	Same as above
4 mi.N.of Franklin	Watauga Baptist Ch.	165	6	116	- -	2	Granite
Highlands	Town	500	10	82	5	15	Granite
Highlands	Town	250	8	14	3	-	Granite
Highlands	Country Club	600	8	- -	- -	30	Granite
Highlands	H.F.Pidcock	110	6	20	25	20	Granite

Swain County

Location	Owner	Depth (ft.)	Diam. (in.)	Depth of Casing (ft.)	Water Level (ft. below surface)	Yield (g.p.m.)	Remarks
Bryson City	Garn Eller	100	6	- -	58	5	- -
Bryson City	H.P. Browning	130	6	88	- -	30	Granite
Bryson City	R.L.Leatherwood	112	6	48	26	25	Granite
Bryson City	Alene Ferrell	130	6	84	- -	35	Granite
4 mi.NE of Bryson City	T.K. Hyatt	175	6	91	- -	- -	Granite
4 mi.NE of Bryson City	S.S.Haynie	225	6	64	- -	3	Granite
4 mi.NE of Bryson City	M.F.Soule	75	6	52	12	28	Granite
Birdtown	Croft Jenkins	115	6	35	- -	15	Granite
Cherokee	O.D. McDonald	187	6	125	- -	15	Granite
Cherokee	Ross Caldwell	250	6	18	- -	12	Granite
Cherokee	Carie Robinson	100	6	51	10	7	- -
Cherokee	Lonnie Whitaker	160	6	51	- -	5	- -
10 mi.SW of Bryson City	Watts, Inc.	300	8	66	- -	55	- -

Public Water Supplies - Descriptions and chemical character of public supplies of water, both surface water and ground water, are contained in Chapter II of this publication.

Chemical Character of Surface Waters - The following material, taken from Bulletin 52, Volumes 1-12, inclusive, published by the North Carolina Department of Conservation and Development and prepared cooperatively by the Geological Survey, U. S. Department of the Interior, comprises analyses of samples of surface waters in the Hiwassee and Little Tennessee River Basins in North Carolina, collected, during the period from October 1, 1944 to September 30, 1956, daily for some stations and monthly for other stations, at or near points where continuous stream-measurement stations were maintained. In addition to the daily and monthly samples, samples were also collected periodically at miscellaneous stream-measurement sites. This additional data made it possible to predict the chemical character of the stream at various points within the Hiwassee and Little Tennessee River Bains. Information regarding definitions and limits of tolerance, pertaining to hardness, conductivity, pH, suspended matter, color, oxygen consumed, dissolved solids, and other characteristics of quality of water as determined by chemical analyses, may be found on pages 80-84, inclusive, "Water Resources of North Carolina", published by the North Carolina Department of Conservation and Development in January 1955.

Alarka Creek near Bryson City, Swain County

Date	4-24-47	5-13-48	Na + K	2.2	.0.9
Discharge (cfs)	54.0	- -	Bicarbonate	9.0	8.0
Color	14	3	Sulfate	1.0	1.6
pH	7.0	6.9	Chloride	0.6	0.8
Silica	8.0	9.7	Fluoride	0.0	0.1
Iron	0.06	0.04	Nitrate	0.1	0.2
Calcium	1.2	2.3	Dissolved		
Magnesium	0.4	0.5	solids	19	22
			Tot. hardness	5	8

Brasstown Creek at Brasstown, Clay County

Date	3-7-47	Na plus K	1.9
Discharge (cfs)	172	Bicarbonate	10
Color	13	Sulfate	1.7
pH	7.4	Chloride	1.0
Silica	7.4	Fluoride	0.1
Iron	0.03	Nitrate	0.5
Calcium	1.8	Dissolved solids	23
Magnesium	0.8	Total hardness	8

Burningtown Creek at Stiles, Macon County

Date	5-13-48	Bicarbonate	8
Color	2	Sulfate	1.4
pH	6.7	Chloride	0.5
Silica	9.2	Nitrate	0.1
Iron	0.07	Dissolved solids	20
Magnesium	0.9	Total hardness	8
Na plus K	0.5		

Camp Creek at Patrick, Cherokee County

Date	6-22-48	Bicarbonate	12
Color	4	Sulfate	1.9
pH	6.4	Chloride	1.1
Silica	7.6	Nitrate	0.9
Iron	0.02	Calcium	2.6
Magnesium	1.0	Dissolved solids	26
Na plus K	1.6	Total hardness	11

Cane Creek near Murphy, Cherokee County

Date	6-22-48	Bicarbonate	18
Color	5	Sulfate	1.9
pH	6.5	Chloride	1.4
Silica	6.7	Nitrate	0.3
Calcium	3.8	Dissolved solids	29
Magnesium	1.1	Total hardness	14
Na plus K	2.3		

Cartoogechaye Creek near Franklin, Macon County

Date	4-18-47	5-13-48	Na plus K	2.1	2.0
Discharge (cfs)	253	- -	Bicarbonate	13	14
Color	11	7	Sulfate	1.1	1.5
pH	6.8	7.0	Chloride	0.9	0.9
Silica	9.0	10	Nitrate	0.2	0.1
Iron	0.08	0.05	Dissolved solids	23	30
Calcium	1.8	2.5	Total hardness	9	10
Magnesium	1.0	0.9			

Chatuge Reservoir near Hayesville, Clay County

Date	6-22-48	Bicarbonate	10
Color	3	Sulfate	1.5
pH	6.2	Chloride	1.1
Silica	6.7	Nitrate	0.4
Calcium	1.9	Dissolved solids	20
Iron	0.02	Total hardness	8
Magnesium	0.7	Na plus K	1.8

Cheoah River at Tapoco, Graham County

Date	2-24-47	4-14-48	Bicarbonate	7.0	8.0
Discharge (cfs)	136	- -	Sulfate	2.5	1.3
Color	9	2	Chloride	0.6	0.5
pH	6.6	6.9	Fluoride	0.1	0.1
Silica	5.8	6.7	Nitrate	0.2	0.1
Iron	0.02	0.06	Dissolved solids	17	18
Calcium	1.2	1.0	Total hardness	5	5
Magnesium	0.4	0.4	Na plus K	2.3	2.0

Colvard Creek near Tomatla, Cherokee County

Date	9-5-54	Calcium	1.0	Bicarbonate	7.0	Hardness	5
Discharge (cfs)	0.72	Magnesium	0.5	Sulfate	2.0	Spec. cond't.	16.8
Silica	6.2	Sodium	1.0	Dissolved solids	18	pH	6.1
Iron	0.02	Potassium	0.5	Chloride	0.5	Color	9

Connelly Creek at Whittier, Swain County

Date	9-1-53	Chloride	0.8
Discharge (cfs)	5.58	Fluoride	0.1
Silica	10	Nitrate	0.1
Iron	0.03	Dissolved solids	26
Calcium	1.6	Total hardness	6
Magnesium	0.4	Specific conductance	30.3
Na + K	2.1	pH	6.3
Bicarbonate	9	Color	17
Sulfate	1.3		

Cooper Creek near Bryson City, Swain County

Date	9-1-53	Chloride	0.9
Discharge (cfs)	4.44	Fluoride	0.1
Silica	6.0	Nitrate	0.1
Iron	0.02	Dissolved solids	19
Calcium	0.9	Total hardness	4
Magnesium	0.4	Specific conductance	19.9
Na + K	1.7	pH	6.1
Bicarbonate	6	Color	7
Sulfate	1.1		

Crane Creek at Violet, Cherokee County

Date	6-22-48	Bicarbonate	8.0
Color	4	Sulfate	1.3
pH	6.2	Chloride	0.9
Silica	8.2	Fluoride	0.1
Calcium	1.2	Nitrate	0.3
Magnesium	0.6	Dissolved solids	20
Na + K	1.9	Total hardness	5
Iron	0.02		

Cullasaja River at Cullasaja, Macon County

Date	7-3-46	5-13-48	3-8-54	9-14-54
Discharge (cfs)	172	154	228	31
Suspended matter	40	- -	- -	- -
Color	10	4	5	7
pH	- -	7.1	6.5	6.5
Silica	7.5	7.5	7.0	8.7
Iron	0.03	0.06	0.01	0.02
Calcium	1.6	1.5	1.5	2.3
Magnesium	0.7	0.6	0.3	0.6
Na + K	1.8	1.7	2.1	2.6
Bicarbonate	9.0	9.0	6	13
Sulfate	1.3	1.2	2.6	1.6
Chloride	1.1	0.9	1.0	1.2
Fluoride	0.0	0.0	0.1	0.0
Nitrate	0.7	0.2	0.4	0.3
Dissolved solids	22	22	18	28
Total hardness	7	6	5	8
Specific conductance	7	6	5	8

Cullasaja River at Cullasaja, Macon County

Date	11-17-55	1-9-56	2-7-56	3-7-56	4-13-56
Discharge (cfs)	81	60	244	365	152
Temperature (°F)	51	45	45	- -	52
Silica	9.1	9.1	5.5	7.4	6.2
Iron	0.03	0.04	0.01	0.01	0.01
Calcium	1.8	1.6	1.4	1.3	1.6
Magnesium	0.4	0.5	0.1	0.1	0.2
Sodium	1.7	1.3	0.9	1.0	1.1
Potassium	0.8	0.4	0.4	0.3	0.6
Bicarbonate	12	9	6	8	8
Sulfate	2.3	1.4	1.8	1.4	0.5
Chloride	1.2	1.2	1.5	1.0	0.8
Color	8	10	10	20	7
Nitrate	0.0	0.1	0.3	0.3	0.3
Dissolved solids	26	21	15	18	19
Hardness	6	6	4	4	5
Specific conductance	26.4	22.5	20.8	21.0	17.6
pH	6.6	6.6	6.2	6.5	6.4

Cullasaja River at Cullasaja cont'd.

Date	5-21-56	6-12-56	7-13-56	8-7-56	9-13-56
Mean discharge (cfs)	152	142	131	74	47
Temperature (°F)	- -	- -	68	73	66
Silica	8.1	8.3	7.5	8.3	9.1
Iron	0.02	0.02	0.02	0.10	0.01
Calcium	1.4	1.2	1.2	1.2	2.4
Magnesium	0.3	0.2	0.2	0.2	0.2
Sodium	1.3	1.7	1.7	2.1	2.2
Potassium	0.6	0.6	014	1.4	0.5
Bicarbonate	8	9	8	10	14
Sulfate	0.4	0.4	1.6	1.1	1.5
Chloride	0.8	0.8	0.8	0.8	1.0
Fluoride	0.0	0.0	0.0	0.0	0.2
Nitrate	0.3	0.2	0.4	0.3	0.1
Dissolved solids	20	23	22	24	25
Hardness	5	4	4	4	7
Specific conductance	18.9	21.1	19.1	20.9	27.4
pH	6.3	6.5	6.4	6.5	6.6
Color	7	8	15	20	4

Deep Creek at Bryson City, Swain County

Date	4-17-47	6-24-50	9-15-50	6-6-55
Discharge (cfs)	207	92.0	68.6	70.5
Color	7	3	- -	3
pH	6.75	6.4	6.6	6.7
Silica	4.7	6.9	- -	6.6
Iron	0.03	0.02	- -	0.1
Calcium	1.0	1.2	- -	0.9
Magnesium	0.4	0.5	- -	0.1
Na + K	1.5	1.7	- -	1.5
Bicarbonate	7.0	7	8	7
Sulfate	1.1	2.1	1.0	0.2
Chloride	0.2	0.4	1.0	0.1
Nitrate	0.2	0.2	- -	0.3

Deep Creek at Bryson City cont'd.

	4-17-47	6-24-50	9-15-50	6-6-55
Dissolved solids	13	18	- -	13
Total hardness	4	5	4	2
Specific conductance	- -	15.2	14.6	11.6

East Fork Tuckasegee River at Tuckasegee, Jackson County

Date	4-9-47	Na + K	1.8
Discharge (cfs)	182	Bicarbonate	7.0
Color	11	Sulfate	1.0
pH	6.7	Chloride	0.8
Silica	5.9	Nitrate	0.1
Iron	0.05	Dissolved solids	16
Calcium	1.0	Total hardness	4
Magnesium	0.4		

Fires Creek near Hayesville, Clay County

Date	6-22-48	Na + K	1.3
Color	7	Bicarbonate	5
pH	6.4	Sulfate	1.5
Silica	5.9	Chloride	0.6
Iron	0.02	Nitrate	0.2
Calcium	0.7	Dissolved solids	16
Magnesium	0.5	Total hardness	4

Fontana Reservoir at Fontana Dam, Graham County

Date	5-14-58	Bicarbonate	8.0
Color	7.0	Sulfate	3.3
pH	7.1	Chloride	0.6
Silica	7.1	Fluoride	0.1
Iron	0.02	Nitrate	0.2
Calcium	1.8	Dissolved solids	23
Magnesium	0.4	Total hardness	6
Na plus K	2.3		

Galbreath Creek near Bryson City, Swain County

Date	9-18-52	Chloride	1.2
Discharge (cfs)	1.73	Sulfate	1.1
Silica	10	Nitrate	0.7
Iron	0.10	Dissolved solids	23
Calcium	1.6	Total hardness	6
Magnesium	0.5	Specific conductance	23.0
Na + K	2.6	pH	6.5
Bicarbonate	10	Color	6

Glenville Lake near Glenville, Jackson County

Date	5-13-48	Bicarbonate	8
Color	6	Sulfate	1.4
pH	6.5	Chloride	0.8
Silica	4.7	Fluoride	0.1
Iron	0.07	Nitrate	0.4
Calcium	1.6	Dissolved solids	17
Magnesium	0.3	Total hardness	5
Na + K	2.0		

Hanging Dog Creek near Murphy, Cherokee County

Date	6-22-48	Bicarbonate	9
Color	3	Sulfate	1.4
pH	6.2	Chloride	0.9
Silica	7.6	Fluoride	0.1
Iron	0.10	Nitrate	0.4
Calcium	1.4	Dissolved solids	21
Magnesium	0.7	Total hardness	6
Na + K	1.9		

Hazel Creek at Proctor, Swain County

Date	7-26-46	5-14-48	Na + K	2.3	0.4
Discharge (cfs)	66	91	Bicarbonate	8.0	4
Suspended matter	3	- -	Sulfate	1.4	1.1
Color	5	8	Chloride	0.8	0.2
pH	-	6.9	Fluoride	0.0	0.1
Silica	5.3	5.9	Nitrate	0.3	0.1
Iron	0.01	0.01	Dissolved solids	16	16
Calcium	1.1	1.2	Total hardness	4	4
Magnesium	0.4	0.3			

Hiwassee River at Chatuge Dam near Hayesville, Clay County

Date	7-10-46	1946-47	6-22-48	6-9-55	12-6-55
Discharge (cfs)	438	282	4.2	12.0	3.77
Suspended matter	1	-	-	-	-
Color	3	8	3	3	11
pH	-	6.65	6.2	6.6	6.6
Silica	6.3	6.1	6.7	8.1	7.2
Iron	0.02	0.05	0.02	-	0.03
Calcium	1.7	1.9	1.9	2.0	2.0
Magnesium	0.9	0.9	0.7	0.8	0.9
Na + K	2.9	2.3	1.8	1.9	2.3
Bicarbonate	12	12	10	12	13
Sulfate	2.3	1.5	1.5	2.7	1.0
Chloride	1.1	1.0	1.1	1.0	1.0
Fluoride	0.0	0.1	0.0	0.0	0.0
Nitrate	0.6	0.7	0.4	1.1	0.9
Dissolved solids	22	21	20	24	21
Total hardness	8	8	8	8	9
Specific conductance	-	-	-	26.5	25.7

Hiwassee River above Murphy, Cherokee County

Date	7-8-46	1946-47	6-22-48	6-7-55	12-5-55
Discharge (cfs)	1,020	930	440	1,530	1,970
Suspended matter	15	-	-	-	-
Color	5	10	3	16	17
pH	-	6.75	6.2	6.7	6.6
Silica	7.0	6.7	7.6	6.8	6.5
Iron	0.04	0.07	0.02	0.03	0.04
Calcium	1.8	1.7	2.2	1.3	1.9
Magnesium	0.8	0.8	1.0	0.9	0.6
Na + K	2.5	2.3	1.2	1.7	1.9
Bicarbonate	11	11	9	9	10

Hiwassee River above Murphy cont'd.

	7-8-46	1946-47	6-22-48	6-7-55	12-5-55
Sulfate	1.6	1.6	2.4	2.4	1.1
Chloride	1.5	0.9	1.0	0.8	0.8
Fluoride	0.0	0.1	0.1	0.0	0.0
Nitrate	0.4	0.4	0.9	0.9	0.5
Dissolved solids	21	21	25	19	18
Total hardness	8	8	10	7	7
Specific conductance	-	-	-	20.6	22.4

Hiwassee River below Hiwassee Dam, Cherokee County

Date	6-22-48	Bicarbonate	8
Color	2	Sulfate	1.8
pH	6.3	Chloride	1.1
Silica	5.7	Nitrate	0.3
Iron	0.03	Dissolved solids	18
Calcium	1.8	Total hardness	7
Magnesium	0.5		
Na + K	1.7		

Hyatt Creek at Marble, Cherokee County

Date	8-3-51	8-3-51	8-8-51
Discharge (cfs)	-	7.76	7.07
Color	7	-	-
pH	6.2	6.7	6.6
Specific conductance	21.7	22.7	24.2
Silica	7.9	-	-
Iron	0.06	-	-
Calcium	1.4	-	-
Magnesium	0.6	-	-
Na + K	2.6	-	-
Bicarbonate	8	11	10
Sulfate	3.0	2	2
Chloride	1.1	0.8	1.2
Fluoride	0.1	-	-
Nitrate	0.1	-	-
Dissolved solids	21	-	-
Total hardness	6	5	6

Lands Creek near Bryson City, Swain County

Date	7-13-54	Chloride	1.0
Discharge (cfs)	1.65	Fluoride	0.1
Silica	8.4	Nitrate	0.1
Iron	0.02	Dissolved solids	19
Calcium	0.9	Hardness	3
Magnesium	0.2	Specific	
Na + K	2.5	conductance	17.1
Bicarbonate	6	pH	6.3
Sulfate	1.7	Color	7

Little Brasstown Creek at Brasstown, Clay County

Date	6-22-48	Bicarbonate	16
Color	3	Sulfate	2.5
pH	6.3	Chloride	0.9
Silica	8.1	Fluoride	0.1
Iron	0.03	Nitrate	2.3
Calcium	3.8	Dissolved solids	31
Magnesium	1.6	Total hardness	16
Na + K	1.4		

Little Tennessee River near Dillard, Rabun County, Georgia

Date	11-12-55	Sulfate	1.4
Discharge (cfs)	33.3	Chloride	0.8
Silica	13	Dissolved solids	25
Iron	0.02	Hardness	5
Calcium	1.7	Specific conductance	21.6
Magnesium	0.2	pH	6.6
Sodium	1.5	Color	3
Potassium	0.5	Bicarbonate	9

Little Tennessee River near Fontana, Graham County

Date	7-26-46	5-15-48	6-17-55
Discharge (cfs)	4,780	3,350	6,000
Suspended matter	1	-	-
Color	5	3	12
pH	-	6.4	6.3
Silica	5.2	7.0	7.1
Iron	0.03	0.10	0.03
Calcium	1.7	1.4	1.4
Magnesium	0.7	0.6	0.3
Na + K	2.2	2.4	2.5
Bicarbonate	10	8	8
Sulfate	2.2	2.6	2.4
Chloride	0.8	0.8	0.6
Fluoride	0.0	0.2	0.0
Nitrate	0.4	0.3	0.8
Dissolved solids	21	21	19
Total hardness	7	6	5
Specific conductance	-	-	24.7

Little Tennessee River at Needmore, Swain County

Date	7-25-46	5-13-48	3-11-54	6-17-55	12-19-55
Discharge (cfs)	615	791	1,060	759	555
Suspended matter	37	-	-	-	-
Color	6	2	3	4	11
pH	-	6.8	6.6	6.9	6.9
Silica	10	8.8	8.0	8.5	9.5
Iron	0.06	0.07	0.00	0.05	0.12
Calcium	1.8	2.6	1.9	1.3	1.6
Magnesium	0.8	0.7	0.7	0.6	0.5
Na + K	2.6	0.8	2.1	2.5	2.0
Bicarbonate	12	10	10	10	11
Sulfate	1.5	1.3	1.8	0.3	1.4
Chloride	1.1	0.8	1.2	0.5	0.9

Little Tennessee River at Needmore cont'd.

Date	7-25-46	5-13-48	3-11-54	5-17-55	12-19-55
Fluoride	0.1	0.1	0.1	0.0	0.0
Nitrate	0.3	0.1	0.4	0.8	0.5
Dissolved solids	26	21	21	19	22
Total hardness	8	9	8	6	6
Specific conductance	-	-	20.4	19.0	21.9

Little Tennessee River at Norton, Macon County

Date	5-13-48	Na + K	3.2
Color	3	Bicarbonate	12
pH	3	Sulfate	1.0
Silica	7.0	Chloride	0.8
Iron	0.01	Nitrate	0.1
Calcium	1.4	Dissolved solids	21
Magnesium	0.4	Total hardness	5

Little Tennessee River near Prentiss, Macon County

Date	7-3-46	5-13-48	6-14-55	12-12-56
Discharge (cfs)	615	-	327	154
Suspended matter	85			
Color	3	3	5	11
pH	-	7.0	6.6	6.9
Silica	9.6	7.8	9.1	9.1
Iron	0.04	0.01	0.03	0.08
Calcium	1.6	1.4	1.0	1.8
Magnesium	0.6	0.4	0.1	0.6
Na + K	3.3	3.2	2.0	1.8
Bicarbonate	13	12	8	12
Sulfate	1.2	1.0	0.7	1.4
Chloride	1.0	0.8	0.8	0.6
Nitrate	0.4	0.1	0.3	0.5
Dissolved solids	24	21	18	22
Total hardness	6	5	3	6
Specific conductance	-	-	17.0	21.9

Martin Creek at Murphy, Cherokee County

Date	6-22-48	Bicarbonate	14
Color	7	Sulfate	3.1
pH	6.3	Chloride	1.2
Silica	6.5	Fluoride	0.1
Iron	0.03	Nitrate	2.3
Calcium	3.4	Dissolved solids	31
Magnesium	1.6	Total hardness	15
Na + K	1.6		

Middle Creek at Otto, Macon County

Date	5-13-48	Bicarbonate	8
Color	3	Sulfate	1.1
pH	6.8	Chloride	0.1
Silica	7.3	Nitrate	0.3
Iron	0.04	Fluoride	0.1
Calcium	1.4	Dissolved solids	18
Magnesium	0.6	Total hardness	6
Na + K	1.7		

Nantahala River at Wesser, Swain County

Date	5-14-48	Bicarbonate	9
Color	3	Sulfate	1.6
pH	6.9	Chloride	0.4
Silica	6.1	Fluoride	0.1
Iron	0.03	Nitrate	0.1
Calcium	1.2	Dissolved solids	16
Na + K	2.0	Total hardness	5

Nantahala River at Nantahala, Swain County

Date	7-8-46	6-17-55	12-14-55
Discharge (cfs)	677	639	538
Suspended matter	13	-	-
Color	5	4	11
pH	-	6.6	6.7
Silica	4.8	5.9	6.4
Iron	0.02	0.01	0.05
Calcium	1.3	1.2	1.4
Magnesium	0.6	0.2	0.5
Na + K	2.2	0.8	1.1
Bicarbonate	9.0	7.0	9
Sulfate	1.7	0.1	0.3
Chloride	0.9	0.5	0.5
Nitrate	0.1	0.4	0.2
Dissolved solids	16	13	14
Total hardness	6	4	6
Specific conductance	-	14.8	16.0

Nantahala River near Rainbow Springs, Macon County

Date	7-10-46	6-17-55	12-6-55
Discharge (cfs)	102	154	196
Suspended matter	6	-	-
Color	4	2	12
pH	-	6.8	6.7
Silica	7.5	7.0	6.6
Iron	0.02	0.0	0.04
Calcium	1.9	0.9	1.3
Magnesium	0.7	0.4	0.6
Na + K	1.6	1.1	1.0
Bicarbonate	10	8	8
Sulfate	1.4	0.1	0.1
Chloride	0.8	0.5	0.5
Nitrate	0.3	0.1	0.3
Dissolved solids	20	14	11
Total hardness	8	4	6
Specific conductance	-	13.9	13.6

Nottely River at Ranger, Cherokee County

Date	6-22-48	Bicarbonate	12
Color	3	Sulfate	1.9
pH	6.2	Chloride	1.1
Silica	8.4	Nitrate	0.9
Iron	0.02	Dissolved solids	26
Calcium	2.2	Total hardness	11
Magnesium	1.0	Na + K	2.1

Noland Creek near Bryson City, Swain County

Date	7-15-46	5-13-48	6-17-55	12-8-55
Discharge (cfs)	22	28	40.6	41.7
Suspended matter	2	-	-	-
Color	5	3	3	7
pH	-	6.7	6.8	6.6
Silica	6.4	5.0	5.5	5.0
Iron	0.01	0.02	0.01	0.01
Calcium	0.7	0.5	0.4	1.0
Magnesium	0.3	0.3	0.1	0.1
Na + K	2.4	2.2	1.0	1.3
Bicarbonate	7.0	6	4	4
Sulfate	1.5	1.0	0.1	1.8
Chloride	0.5	0.4	0.4	0.2
Fluoride	0.0	0.2	0.0	0.0
Nitrate	0.3	0.2	0.7	0.3
Dissolved solids	16	13	10	12
Total hardness	3	2	2	3
Specific conductance	-	-	9.0	9.3

Oconaluftee River at Birdtown, Swain County

Date	8-7-45	6-6-55	12-8-55
Discharge (cfs)	987	313	386
Suspended matter	106	-	-
Color	17	4	12
Silica	4.5	7.2	6.8
Iron	0.02	0.02	0.04
Calcium	1.6	1.0	1.0
Magnesium	0.5	0.1	0.5
Na + K	1.2	1.6	1.4
Bicarbonate	6.0	7.0	8
Sulfate	2.3	0.1	1.0
Fluoride	0.0	0.1	0.0
Chloride	0.4	0.4	0.5
Nitrate	0.9	0.4	0.2
Dissolved solids	20	14	15
Total hardness	6	3	5
Specific conductance	-	15.7	14.6
pH	-	6.7	6.7

Oconaluftee River at Cherokee, Swain County

Date	8-17-45	1945-46	5-13-48
Discharge (cfs)	218	445	264
Suspended matter	186	7	-
Color	27	6	2
Silica	4.5	5.8	7.2
Iron	0.01	0.02	0.02
Calcium	1.2	1.4	1.0
Magnesium	0.5	0.5	0.4
Na + K	1.6	1.6	1.6
Bicarbonate	6.0	8.1	7
Sulfate	2.4	1.9	1.2
Chloride	0.4	0.6	.2
Fluoride	0.0	0.1	0.0
Nitrate	0.7	0.4	0.3
Dissolved solids	20	18	16
Total hardness	5	6	4
Specific conductance	-	-	7.0

Peachtree Creek near Brasstown, Clay County

Date	6-22-48	Bicarbonate	10
Color	2	Na + K	1.7
pH	6.2	Sulfate	2.0
Silica	7.4	Chloride	1.1
Iron	0.01	Nitrate	0.6
Calcium	2.3	Dissolved solids	22
Magnesium	0.7	Total hardness	9

Persimmon Creek near Ranger, Cherokee County

Date	8-4-48	Bicarbonate	10
Color	5	Sulfate	3.8
pH	6.3	Chloride	1.2
Silica	4.7	Fluoride	0.1
Iron	0.02	Nitrate	0.5
Calcium	2.6	Dissolved solids	22
Magnesium	0.8	Total hardness	10
Na + K	2.2		

Santeetlah Reservoir near Robbinsville, Graham County

Date	5-14-48	Bicarbonate	7
Color	4	Sulfate	1.5
pH	6.7	Chloride	0.6
Silica	4.7	Fluoride	0.2
Iron	0.07	Nitrate	0.1
Calcium	0.7	Dissolved solids	14
Magnesium	0.5	Total hardness	4
Na + K	2.3		

Scott Creek at Dillsboro, Jackson County

Date	4-21-49	Na + K	12
Discharge (cfs)	135	Bicarbonate	28
Color	100	Sulfate	10
pH	6.3	Chloride	0.2
Specific conductance	58.1	Fluoride	0.1
Silica	10	Dissolved solids	61
Iron	0.01	Total hardness	7
Calcium	2.0	Nitrate	0.1
Magnesium	0.5		

Scott Creek above Sylva, Jackson County

Date	11-11-44	6-13-55	12-13-55
Discharge (cfs)	202	102	61.8
Suspended matter	8	-	-
Color	6	1	7
Silica	15	9.9	10
Iron	0.10	0.00	0.03
Calcium	2.9	1.5	2.0
Magnesium	1.4	0.8	0.8
Na + K	12	2.1	2.3
Bicarbonate	32	11	13
Sulfate	3.1	2.3	2.5
Chloride	1.5	0.5	0.8
Fluoride	0.1	0.0	0.0
Nitrate	1.6	0.6	0.6
Dissolved solids	28	23	25
Total hardness	10	7	8
Specific conductance	-	23.5	26.2
pH	-	6.9	6.8

Shoal Creek near Vests, Cherokee County

Date	8-4-48	Bicarbonate	11
Color	5	Sulfate	2.4
pH	6.3	Chloride	1.2
Silica	4.7	Fluoride	0.1
Iron	0.02	Nitrate	0.4
Calcium	2.6	Dissolved solids	22
Magnesium	0.6	Total hardness	7
Na + K	2.9		

Shooting Creek near Hayesville, Clay County

Date	6-22-48	5-23-55	Bicarbonate	13	10.6
Discharge (cfs)	48	107	Sulfate	1.3	0.7
Color	6	4	Chloride	0.8	0.8
pH	6.6	6.8	Fluoride	0.1	0.0
Silica	9.5	8.3	Nitrate	0.4	0.7
Iron	0.03	0.01	Dissolved solids	25	19
Calcium	2.2	1.5	Total hardness	10	6
Magnesium	1.1	0.5	Specific conductance	-	22.0
Na + K	1.7	1.3			

Snowbird Creek near Robbinsville, Graham County

Date	7-26-46	5-14-48	Na + K	1.8	0.9
Discharge(cfs)	86	113	Bicarbonate	7.0	6
Suspended matter	6	-	Sulfate	1.4	0.9
Color	18	7	Chloride	0.5	0.4
pH	-	7.0	Fluoride	0.2	0.0
Silica	5.1	4.7	Nitrate	0.2	0.0
Iron	0.01	0.01	Dissolved solids	18	15
Calcium	1.2	1.3	Total hardness	5	4
Magnesium	0.4	0.3			

Soco Creek at Cherokee, Swain County

Date	4-10-47	Na + K	2.0
Discharge (cfs)	83.3	Bicarbonate	9.0
Color	9	Sulfate	1.1
pH	7.0	Chloride	0.6
Silica	7.0	Fluoride	0.6
Iron	0.05	Nitrate	0.1
Calcium	1.2	Dissolved solids	19
Magnesium	0.5	Total hardness	5

Tessentee Creek at Otto, Macon County

Date	5-13-48	Bicarbonate	8
Color	8	Na + K	1.4
pH	7.0	Sulfate	.9
Silica	7.8	Chloride	.9
Iron	0.01	Nitrate	.1
Calcium	1.5	Dissolved solids	20
Magnesium	0.5	Total hardness	6

Tuckasegee River at Bryson City, Swain County

Date	8-7-45	5-13-48	6-18-55	12-14-55
Discharge (cfs)	1,970	1,270	1.250	801
Suspended matter	260	-	-	-
Color	13	6	24	45
Silica	7.4	7.7	7.3	7.6
Iron	0.04	0.08	0.04	0.08
Calcium	2.0	1.4	1.7	1.9
Magnesium	0.7	0.5	0.4	0.8
Na + K	3.8	4.5	6.5	7.9
Bicarbonate	12	12	14	18
Sulfate	4.1	4.0	7.7	7.7
Chloride	0.8	0.6	0.5	1.0
Fluoride	0.0	0.1	0.0	0.0
Nitrate	1.1	0.2	0.8	0.2
Dissolved solids	30	29	32	36
Total hardness	8	6	6	8
pH	-	6.4	6.3	6.4
Specific conductance	-	-	41.8	49.4

Tuckasegee River at Dillsboro, Jackson County

Date	8-6-45	4-21-49	6-13-55	12-15-55
Discharge (cfs)	728	1,080	40.	472
Suspended matter	525	-	-	-
Color	7	4	40	38
Silica	7.0	6.7	8.0	7.2
Iron	0.03	0.01	0.21	.10
Calcium	2.1	1.4	2.2	2.1
Magnesium	0.7	0.7	0.6	.7
Na + K	2.4	1.7	7.5	5.2
Bicarbonate	10	8	18	14
Sulfate	2.8	1.9	6.5	5.8
Chloride	0.8	0.8	0.5	1.0
Fluoride	0.0	0.1	0.0	.4
Nitrate	1.5	0.3	1.3	.2
Dissolved solids	27	20	36	30
Total hardness	8	6	8	8
pH	-	6.9	6.3	6.4
Specific conductance	-	19.3	49.4	39.2

Tuckasegee River at Tuckasegee, Jackson County

Date	8-6-45	3-9-54	9-7-54	6-13-55	12-15-55
Discharge (cfs)	373	334	124	35.8	269
Suspended matter	207	-	-	-	-
Color	10	4	2	21	9
Silica	5.4	6.9	7.6	5.3	5.5
Iron	0.02	0.01	0.06	0.10	0.11
Calcium	1.2	1.2	1.9	1.3	1.6
Magnesium	0.4	0.5	0.9	0.2	0.4
Na + K	2.3	1.8	1.6	1.3	1.7
Bicarbonate	7.0	6	8	6	8
Sulfate	2.1	2.1	4.0	2.5	2.2
Chloride	0.6	1.0	1.0	0.2	0.5
Fluoride	0.0	0.0	0.1	0.0	0.0
Nitrate	1.0	0.5	0.5	0.5	0.8
Dissolved solids	24	18	22	14	17
Total hardness	5	5	8	4	6
Specific conductance	-	35.0	23.3	15.2	17.8
pH	-	6.5	6.0	6.4	6.3

Tulula Creek at Robbinsville, Graham County

Date	3-24-47	Na + K	1.4
Discharge (cfs)	72.7	Bicarbonate	6.0
Color	12	Sulfate	1.5
pH	6.6	Chloride	0.8
Silica	4.9	Fluoride	0.1
Iron	0.03	Nitrate	0.2
Calcium	1.2	Dissolved solids	15
Magnesium	0.5	Total hardness	5

Tusquitee Creek near Hayesville, Clay County

Date	3-7-47	6-22-48
Discharge (cfs)	141	-
Color	13	3
pH	6.7	6.2
Silica	5.3	7.4
Iron	0.05	0.01
Calcium	1.0	1.7
Magnesium	0.5	0.6
Na + K	1.6	2.1
Bicarbonate	5.0	10
Sulfate	2.3	1.9
Chloride	0.6	0.6
Fluoride	0.2	0.0
Nitrate	0.1	0.3
Dissolved solids	16	19
Total hardness	5	4

Twentymile Creek near Fontana, Graham County

Date	2-24-47	Na + K	1.9
Discharge (cfs)	45.5	Bicarbonate	6.0
Color	8	Sulfate	1.6
pH	6.8	Chloride	0.4
Silica	4.6	Fluoride	0.1
Iron	0.01	Dissolved solids	13
Calcium	0.8	Total hardness	3
Magnesium	0.3		

Valley River at Andrews, Cherokee County

Date	3-7-47	6-22-48			
Discharge	144	-			
Color	10	6			
pH	6.8	6.4			
Silica	5.5	6.8			
Iron	0.03	0.01	Dissolved solids	17	22
Calcium	1.6	2.2	Total hardness	6	8
Magnesium	0.6	0.6			
Na + K	1.1	2.3			
Bicarbonate	6.0	11			
Sulfate	2.5	2.3			
Chloride	0.4	0.8			
Fluoride	0.2	-			
Nitrate	0.2	0.6			

Valley River at Tomotla, Cherokee County

Date	7-8-46	6-22-48	6-7-55	12-5-55
Discharge (cfs)	144	104	122	559
Color	7	7	4	8
pH	-	6.2	6.9	7.1
Silica	7.1	6.4	6.9	6.1
Iron	0.03	0.03	0.02	0.05
Calcium	3.8	3.2	3.8	2.6
Magnesium	1.0	1.2	0.6	0.8
Na + K	2.1	1.4	1.8	2.2
Bicarbonate	17	13	16	12
Sulfate	1.9	2.8	0.7	1.4
Chloride	1.0	0.8	0.8	1.0
Fluoride	0.1	0.1	0.0	0.0
Nitrate	0.6	1.2	0.3	0.5
Dissolved solids	26	27	23	21
Total hardness	14	13	12	10
Suspended matter	17	-	-	-
Specific conductance	-	-	33.6	25.4

West Fork Tuckasegee River at Tuckasegee, Jackson County

Date	4-9-47	Na + K	1.8
Discharge (cfs)	35.0	Bicarbonate	10
Color	8	Sulfate	1.4
pH	7.1	Chloride	0.6
Silica	7.4	Nitrate	0.2
Iron	0.04	Dissolved solids	22
Calcium	2.2	Total hardness	7
Magnesium	0.3		

Yellowhammer Creek at Tapoco, Graham County

Date	9-25-46	Bicarbonate	7.0
Color	8	Sulfate	2.2
pH	6.8	Chloride	1.5
Silica	7.7	Fluoride	0.1
Iron	0.07	Nitrate	0.1
Calcium	1.4	Dissolved solids	22
Magnesium	0.7	Total hardness	6
Na + K	1.9		

IX - ABATEMENT OF STREAM POLLUTION

Pollution Abatement Legislation - The General Assembly of North Carolina, on April 6, 1951, ratified an act to rewrite Article 21 of Chapter 143 of the General Statutes relating to stream sanitation. This act contains a declaration of policy as follows. It is hereby declared to be the policy of the State that the water resources of the State shall be prudently utilized in the best interest of the people. To achieve this purpose, the government of the State shall assume responsibility for the quality of said resources. The maintenance of the quality of the water resources requires the creation of an agency, charged with this duty and authorized to protect the water requirements for health, recreation, fishing, agriculture, industry, and animal life. This agency shall establish and maintain a program, adequate for present needs and designed to care for the future needs of the State.

The State Stream Sanitation Committee - The act created, within the State Board of Health, a permanent committee, to be known as the "State Stream Sanitation Committee". The duties of the Committee are (1) to develop and adopt classifications of State waters, (2) to survey all waters and identify those which ought to be classified, (3) to assign a classification to each identified water, and (4) to hold public hearings regarding assigned classifications.

Control of New Sources of Pollution - After the effective date of the assignment of classifications pertaining to the identified waters of any watershed within the State, no person shall, to an extent which would adversely affect the condition of the receiving water within such watershed in relation to any of the standards applicable to such water, (1) make any new outlet into the waters of such watershed, (2) construct or operate any new disposal system within such watershed, (3) alter or change the construction or the method of operation of any existing disposal-system within such watershed, (4) increase the quantity of sewage, industrial waste, or other waste discharged through any existing outlet or processed in any existing disposal system, or (5) change the nature of the sewage, industrial waste, or other waste discharged through any existing outlet or processed in any existing disposal-system.

Actions by the Committee - The Committee adopted a series of classifications, and the standards applicable to each such classification, after holding, in 1953, public hearings at Asheville, Charlotte, Greensboro, Fayetteville, and Washington. It has assigned classifications to the waters of the Yadkin-Pee Dee, Whiteoak (including North, Northport, and New), Chowan, Roanoke, and French Broad River Basins. Classifications of the waters of the Cape Fear and Neuse River Basins are expected to be assigned during 1958. Surveys of the waters of the Catawba, Pasquotank, Tar-Pamlico, Hiwassee, and Little Tennessee River Basins, upon which assignments of classifications will be based, are in progress.

Hiwassee and Little Tennessee River Basins - A survey of water uses and significant sources of pollution, in the Little Tennessee River Basin, was initiated in September 1957. The water-use survey was completed in November. Data showing uses, pollution sources, and proposed sampling-station locations were prepared, in December, for conduct of studies to be carried on in the Little Tennessee River Basin during the following spring and summer. A survey of water uses was completed in May 1958, and sampling work was initiated on June 10. Routine stream-studies in this basin were expected to be completed in 1958. Sampling work in the Hiwassee River Basin was initiated on July 29, 1958.

General - Information regarding water control; problems of watershed management; the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 2nd Session, approved August 4, 1954); and the North Carolina Soil Conservation Districts Law, enacted by the 1937 Session of the General Assembly, may be found in Chapter XIII of "Water Resources of North Carolina, Department of Conservation and Development, 1955". The quoted publication comprises Volume I of the series of 12 volumes pertaining to the water resources of the State, of which the material herein, regarding the water resources of the Hiwassee River Basin and the Little Tennessee River Basin, forms Volume X.

Soil Conservation Practices Accomplished and Contemplated - The data contained in the following tables of "Soil Conservation Practices Accomplished" and "Soil Conservation Practices Contemplated" were furnished by the State Conservationist, Soil Conservation Service, U. S. Department of Agriculture, Raleigh, North Carolina, for the six counties lying wholly or partially within the Hiwassee and Little Tennessee River Basins. Macon, Swain, Jackson, Cherokee, Clay, and Graham Counties comprise Soil Conservation Districts Nos. 25, 28, 29, 32, 34, and 36, respectively. This situation is different from other North Carolina river basins in which two to five counties are included in a soil conservation district.

All or a part of the following counties lie in the Hiwassee and Little Tennessee River Basins as indicated:

Cherokee	All in Hiwassee River Basin.
Clay	Western 7/8 in Hiwassee River Basin; Eastern 1/8 in Little Tennessee River Basin.
Graham	All in Little Tennessee River Basin.
Jackson	Southern 1/8 in Savannah River Basin; Northern 7/8 in Little Tennessee River Basin.
Macon	Southwestern corner in Hiwassee River Basin; Remainder in Little Tennessee River Basin.
Swain	All in Little Tennessee River Basin.

The large number of district cooperators, shown on the table of "Soil Conservation Practices Contemplated", does not necessarily signify an unwillingness on the part of farmers in those counties to carry out conservation plans. On the other hand, it simply means that the small number of Soil Conservation Service technicians available in North Carolina have been unable thus far to work with all these farmers. The State Conservationist hopes to reach them all as rapidly as possible.

Watershed Protection and Flood Prevention - As of July 15, 1958, the North Carolina Department of Conservation and Development had no knowledge of any watershed in the Hiwassee and Little Tennessee River Basins for which an application for planning assistance, under the provisions of Public Law 566, 83rd Congress, approved August 4, 1954, had been submitted to the State Conservationist, Soil Conservation Service, U. S. Department of Agriculture, Raleigh, North Carolina.

SOIL CONSERVATION PRACTICES ACCOMPLISHED

ITEM	UNIT	CHEROKEE	CLAY	GRAHAM	JACKSON	MACON	SWAIN	TOTAL
Closed Drains	Lin.Ft.	28,371	74,198	15,887	26,167	23,760	47,650	216,033
Conservation Crop Rotation	Acres	2,014	1,893	16	1,453	3,464	605	9,445
Contour Farming	Acres	3,182	512	162	1,321	5,682	577	11,436
Contour Stripcropping	Acres	36	472	7	1,029	199	80	1,823
Cover Cropping	Acres	1,420	392	1,400	1,713	3,142	1,108	9,175
Critical Area Planting	Acres	- -	22	- -	24	15	- -	61
Crop Residue Utilization	Acres	1,951	1,694	1,400	5,225	1,149	924	12,343
Drainage	Acres	176	1	47	110	171	193	698
Group Enterprise	Miles	- -	- -	- -	0	- -	- -	- -
Group Enterprise	Cu.Yds.	- -	- -	- -	0	- -	- -	- -
Improvement Cutting	Acres	2,524	644	150	4,538	1,419	1,527	10,802
Open Drains	Miles	9	2	- -	1	1	1	14
Open Drains	Cu.Yds.	9,056	4,000	- -	2,464	4,000	6,700	26,220
Pasture Planting	Acres	8,350	3,111	1,200	7	7,523	408	20,599
Pond Construction	No.	12	8	1	4,107	5	9	4,142
Sprinkler Irrigation Systems	No.	1	3	1	6	- -	2	13
Sprinkler Irrigation Systems	Acres	10	52	12	77	- -	20	171
Terracing	Miles	- -	- -	- -	0	- -	- -	- -
Tree Planting	Acres	2,446	442	22	6,082	98	187	9,277
Waterway Development	Acres	- -	- -	- -	0	- -	- -	- -
Wildlife Area Improvement	Acres	24	25	1	2	32	20	104
District Cooperators	No.	70	45	66	55	37	61	334

SOIL CONSERVATION PRACTICES CONTEMPLATED

ITEM	UNIT	CHEROKEE	CLAY	GRAHAM	JACKSON	MACON	SWAIN	TOTAL
Closed Drains	Lin.Ft.	671,679	56,000	580,541	24,345	231,740	38,220	1,602,515
Conservation Crop Rotation	Acres	8,211	6,307	2,984	7,087	13,415	5,047	43,051
Contour Farming	Acres	4,359	7,517	2,238	4,438	12,118	2,682	33,352
Contour Stripcropping	Acres	3,639	3,538	2,393	2,196	1,561	1,630	14,957
Cover Cropping	Acres	1,580	708	2,600	2,673	10,773	1,054	19,388
Critical Area Planting	Acres	- -	34	- -	196	4,985	500	5,715
Crop Residue Utilization	Acres	8,274	8,461	5,835	4,764	2,728	3,585	33,647
Drainage	Acres	2,874	103	1,435	651	2,932	572	8,567
Group Enterprise	Miles	- -	- -	- -	3	- -	5	8
Group Enterprise	Cu.Yds.	- -	- -	- -	1,320	- -	10,000	11,320
Improvement Cutting	Acres	72,726	26,356	26,625	38,309	79,154	31,469	274,639
Open Drains	Miles	36	14	1	4	99	9	163
Open Drains	Cu.Yds.	180,000	70,000	3,500	16,280	495,000	43,300	808,080
Pasture Planting	Acres	12,650	6,109	6,282	1	10,103	5,663	40,808
Pond Construction	No.	88	176	19	3,663	135	45	4,126
Sprinkler Irrigation Systems	No.	99	137	49	25	50	17	377
Sprinkler Irrigation Systems	Acres	490	748	738	245	1,000	672	3,893
Terracing	Miles	- -	- -	- -	0	- -	- -	- -
Tree Planting	Acres	6,741	1,588	716	8,584	8,952	11,163	37,744
Waterway Development	Acres	- -	- -	- -	0	- -	- -	- -
Wildlife Area Development	Acres	618	491	99	790	274	294	2,566
District Cooperators	No.	1,749	904	651	1,816	1,958	668	7,746